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DISEASES OF THE NOSE AND THROAT

Chas. E. Sajous

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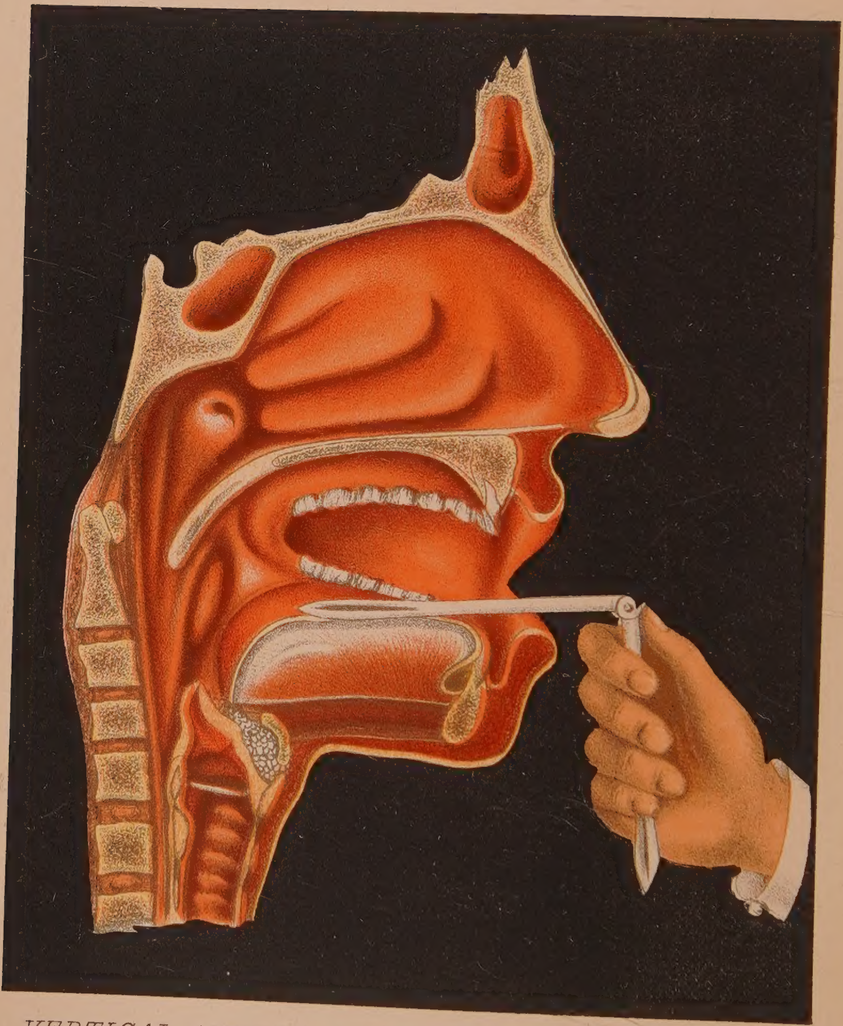
Plate I.



VERTICAL ANTERO-POSTERIOR SECTION OF THE NASAL CAVITIES, MOUTH, PHARYNX AND LARYNX.

C. E. Sajous, Pinxit.

Burk & Mc Fetridge, Lith. Phila.

Tenth Thousand.

LECTURES
ON THE
DISEASES
OF THE
NOSE AND THROAT,

DELIVERED DURING THE SPRING SESSION OF
JEFFERSON MEDICAL COLLEGE.

BY

CHARLES E. SAJOUS, M.D.,

Lecturer on Rhinology and Laryngology in the Jefferson Medical College; one of the Physicians in charge
of the Throat Department, Jefferson College Hospital; Ex-President of the Philadelphia Laryngological Society; Fellow of the American Laryngological Association; Corresponding Member of the Royal Society of Belgium, and of the
Medical Society of Warsaw (Poland), etc., etc.

ILLUSTRATED WITH ONE HUNDRED CHROMO-LITHOGRAPHS, FROM OIL PAINTINGS BY
THE AUTHOR, AND NINETY-THREE ENGRAVINGS ON WOOD.

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TO THE MEMORY OF

PROF. SAMUEL D. GROSS, M.D., LL.D.

(D.C.L. Oxon.; LL.D. Cantab.; LL.D. Edin.;
LL.D. Univ. Penna.)

THIS WORK IS AFFECTIONATELY

DEDICATED

BY

THE AUTHOR.

PREFACE.

In presenting this work to the profession, the author's object is to furnish the general practitioner not only a guide for the treatment of the diseases of the nose and throat, but also to place before him a representation of the normal and diseased parts as they would appear to him were they seen in the living subject. To do justice to such an undertaking, coloring was obviously of prime importance, the difference between the normal and pathological state frequently being only appreciable in the change of color. With this object in view, the author has performed the part of artist, as well as anatomist, believing that, though deficient in the former capacity, he might be able to furnish more accurate representations than if the task were confided to a capable artist, unfamiliar with the special subject. Ninety-seven out of the hundred illustrations are original, the great majority of the cases presented being taken from the author's private and hospital practice. Most of the anatomical plates, notably those on the larynx, were copied from nature, the rest being compiled from text-books on anatomy. Some illustrations, as may be noticed, are somewhat diagramatic, the intention being to render them easier of comprehension. As regards the lateral sections representing active disease in the nasal cavities, they are based upon careful anterior and posterior rhinoscopic examinations. Each colored plate has before it an explanatory page, with the exception of Plate I, which, in addition to the description given beneath it, represents the location of the hyperæsthetic spots in a case of hay fever treated by the author.

The plain, concise, though explanatory language employed in lecturing before students, has been preserved; technical terms have, as much as possible, been avoided, and, when employed, their meaning is made obvious by the general sense of the phrase containing them. Discussions have not been entered into, the theories, as to etiology and pathology, given, representing those most generally accepted, with what suggestions the observations of the author have rendered warrantable. An exception to this rule has been made, however, in the case of hay fever, in order to better illustrate the recent views as to the etiology and treatment of that disease.

In relation to treatment, the facilities furnished the author by one of the finest clinics of the United States and a rather extensive practice, have enabled him to test the therapeutical value of the majority of new methods that have come under his notice. Only those presenting advantages over older modes of treatment have been mentioned, those recommended having been productive of the best results. The instruments, with very few exceptions, represent the author's *armamentarium.*

The classification of diseases varies somewhat from that of other works on the subject. The affections have been classed in rotation, according to the progressive pathological changes peculiar to them. Diseases in which throat affections merely occur as a symptom—such as diphtheria, scarlatina, etc.—have been omitted, not belonging strictly to maladies of the throat.

In two cases, the author has taken the liberty to suggest new terms: "Periodical Hyperæsthetic Rhinitis," which appears to him as suggesting not only the true pathological process of the so-called "hay fever," but also its rational treatment; and "Posterior Nasal Pharyngitis," a term better suited than "Post-nasal Catarrh" to indicate the true location of that affection, its anatomical character and its pathological basis.

In the preparation of the work the author has availed himself of the several excellent works on the diseases of the nose and throat published within the last few years, principal among which may be mentioned those by Morell Mackenzie, of London; J. Solis Cohen, of Philadelphia; F. H. Bosworth, of New York; Edward Woakes, of London; C. Fauvel, of Paris; E. Zuckerkandl, of Vienna; G. M. Lefferts, of New York; Lennox Browne, of London, and Clinton Wagner, of New York. Among the works on pathology that have been consulted, Cornil and Ranvier, Green, Frey, and Heitzmann are the principal. The character of the work preventing copious reference, the author desires to state that of the two hundred and odd papers perused, he has received the most valuable information from the contributions to the literature of the subject by Felix Semon, of London; Gordon Holmes, of London; David Newman, of Glasgow; W. MacNeill Whistler, of London; Th. Hering, of Warsaw; L. Bayer, of Brussels; E. J. Moure, of Bordeaux; O. Chiari, of Vienna; Ph. Schech, of Munich; G. Poyet, of Paris, and other equally eminent foreign writers, while among American productions may be mentioned those of Harrison Allen, of Philadelphia; G. M. Lefferts, of New York; R. P. Lincoln, of New York; F. I. Knight, of Boston; T. A. DeBlois, of Boston; S. W. Langmaid, of Boston; George W. Major, of Montreal; Clinton McSherry, of Baltimore; Hiram Christopher, of St. Joseph; T. H. Hartman, of Baltimore, and the authors whose names appear in the text.

The author wishes to state that he is under many obligations to his clinical assistant, Dr. C. Sumner Witherstine, of Germantown, for valuable assistance in the preparation of the work; and to Mr. F. A. Davis, his publisher, who has spared nothing to render the work worthy of its readers.

The colored plates have been prepared by Burk & McFetridge, of Philadelphia, while the wood-cuts were engraved by Messrs. Fickinger & Stowell, of Philadelphia, who, in excellence of workmanship and promptness, are not surpassed.

1630 Chestnut Street,
Philadelphia.

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LECTURES

ON THE

DISEASES OF THE NOSE AND THROAT.

CHAPTER I.

ILLUMINATION.

Garcia, in his first efforts to illuminate the larynx in 1854, made use of the sun's rays. He soon found, however, that they were not available at all times, not only on account of the constantly changing relative positions of the sun and earth, but also through the irregularities of the weather. The fogs of London adding much to these causes of interference, he was often obliged to cease his observations for days and weeks at a time. Not finding the light of an ordinary lamp sufficiently powerful, he tried the oxy-hydrogen and electric lights; but these, being as yet very imperfect, proved unsatisfactory.

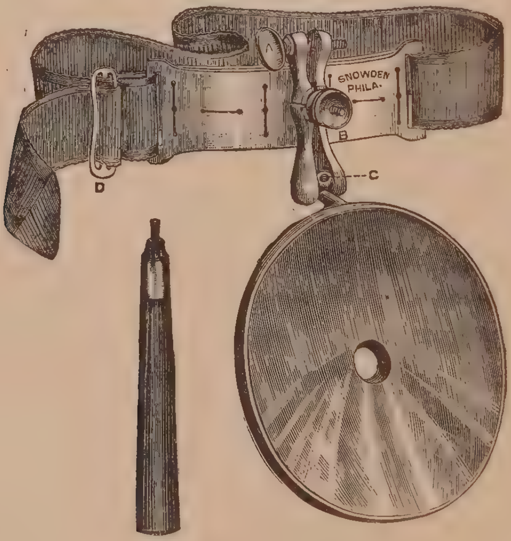
A few years later Czermak, of Pesth, to whom belongs the honor of having introduced laryngoscopy and rhinoscopy in the practice of medicine, made a series of observations upon himself, using the light of an ordinary student lamp. Since then, *artificial* light, a term applied to all lights other than that of the sun—which in contradistinction is called *natural* light—has been in universal use.

Natural light, however, can often be used to great advantage, nothing equalling the brilliancy and steadiness of the sun's rays. These may be directed into the mouth of the patient, or reflected into it by means of a small toilet mirror, either held in the hand or so mounted that it can be tilted in any direction. Diffuse daylight may also be used in the same manner.

Direct illumination is used principally on the Continent of Europe, by directing the light, with or without a condenser, into the cavity to be examined. This is not to be recommended, because the apparatus furnishing the light has to stand between the observer and the patient, thus interfering with the former's movements.

A mirror especially adapted for the purpose of reflecting light from whatever source it may be obtained, was also introduced by Czermak, and is now in general use. It is called the *laryngoscopic reflector* (Fig. 1), and consists of a round concave mirror, three to four inches in diameter, with a focus of from eight to fourteen inches. As ordinarily made, it has a focus of twelve inches, and can be used by the majority of persons. A head-band is attached to it, by means of a ball-and-socket joint, which enables it to be inclined in any direction when in position.

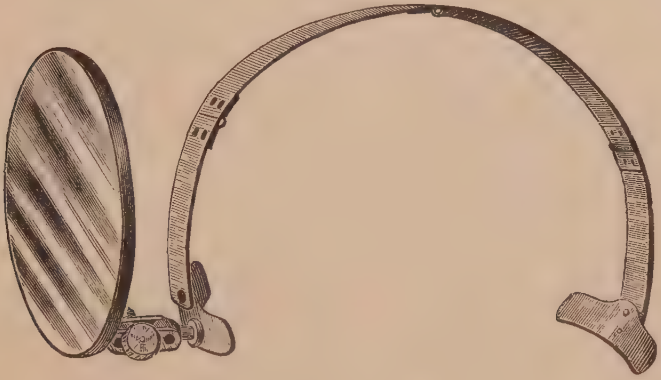
Fig. 1.



Reflector with circular head-band.

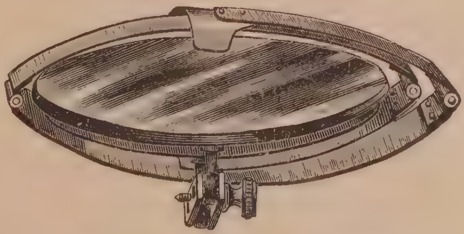
A much more convenient head attachment, however, is that invented by Mr. Ivan Fox, an optician of Philadelphia. It consists of four steel blades, three-quarters of an inch wide, connected longitudinally by hinges, and forming a steel band which, when opened, assumes the shape of a line passing *over* the head, from forehead to occiput (Fig. 2). One end is attached to the ball-and-socket joint piece, while the other is furnished with a short transverse blade, which serves as a cushion for the occiput. These ends are five inches apart, and, the fronto-occipital diameter being much more, when the band is passed over the head, it grasps it firmly, affording solid support for the mirror. As shown in Fig. 3, the hinges are placed at such intervals that when the mirror is not in use the band can be wrapped around it, thus rendering it portable while protecting it perfectly.

Fig. 2.



Reflector with Fox's head-band.

Fig. 3.



Fox's head-band folded around reflector.

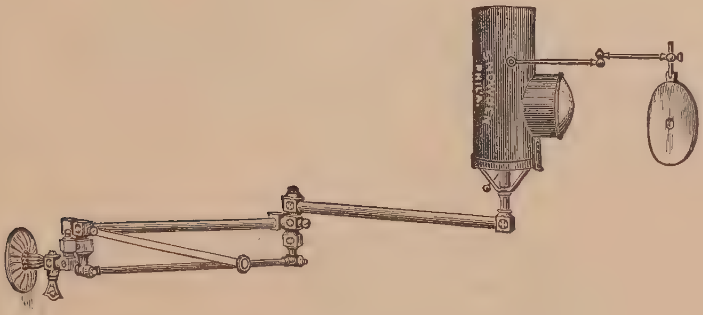
Reflectors are generally perforated through the middle, as in Fig. 1. The hole being held before the pupil of the observer, enables him to bring his line of vision parallel with and in the center of that of the reflected light. Some laryngologists, however, contend that the perforation is not only unnecessary, but that it should not be used, both eyes being required to obtain a correct interpretation of distances. They consequently advise wearing the mirror on the forehead. For my part, I find the perforation advantageous, and can obtain a clearer image with than without it. Besides, the mirror forms an excellent shield for the face—a rather important matter, especially in hospital practice.

Instead of being attached to a head-band, the mirror is sometimes connected with the apparatus furnishing the light, by means of a slender jointed arm (See Fig. 4). When it is used frequently, this arrangement is not only much more convenient, but the reflected light, not being influenced by the motions of the head, is maintained absolutely steady—a marked advantage, especially in operations.

Of artificial lights, gas is certainly the most convenient, being cleanly and always ready. An ordinary bracket may serve the purpose, but the light it furnishes can be much improved by adding an Argand burner, which will give a round instead of a flat flame. It can be further improved by causing it to pass through a lens, which will concentrate its rays. The apparatus I use in the clinic is that constructed by Tobold, of Berlin, mounted on a photographer's head-stand, as devised by Cohen. Its principal feature is a set of lenses held in a cylindrical tube, by means of which the rays of light are concentrated and evenly diffused. The parts are thus illuminated evenly, and the perpendicular shadows existing in a light directly transmitted from the flame are avoided.

Dr. Morell Mackenzie's light condenser is much less complicated and quite as efficient. It consists of a metallic cylinder with a round opening in its side, over which is applied a plano-convex lens. This cylinder is passed over the chimney of the Argand burner and adjusted so as to bring the center of the lens just opposite that of the flame. The same author has devised a rack movement bracket much used by specialists. Fig. 4 represents a bracket much like Dr. Mackenzie's but the rack is replaced by a sliding ring furnished with a thumb-screw, by means of which the instrument can be steadied if necessary. Its joints are sufficiently tight, however, to maintain it in any position, and the sliding ring is only accessory.

Fig. 4.

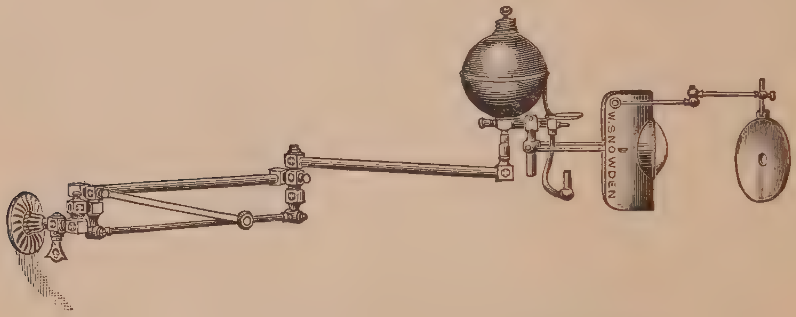


Mackenzie's bull-eye condenser with reflector attached.

I have been using of late a new method lately introduced for general purposes, by which gas-light is made much brighter, whiter and steadier. The gas is caused to pass through a metallic vessel containing a specially prepared substance called "albo-carbon" which, being vaporized by the heat of the gas flame, so enriches the gas as to raise its illuminating power to the highest degree. The metallic vessel or generator can be readily fitted to any bracket. Fig. 5 represents the instrument mounted on a bracket with attachment for laryngoscopic examinations.

The attachment consists of a thin sheet-iron shield five inches high and seven inches wide, bent perpendicularly. A hole two inches in diameter is cut exactly in the center, over which is adapted a plano-convex lens. To the upper left hand corner of the shield a jointed movable arm is attached, which supports the reflecting mirror at its distal end, in such a manner, that it may be placed at any angle in front of the lens, thus reflecting the light as desired. The shield is connected with the carbon generator by means of a stout piece of wire bent into the shape of a horseshoe, the ends of which pass into small pieces of tubing soldered horizontally, one on each side of the shield. To the middle of this horseshoe, a ball, perforated perpendicularly and furnished with a thumb-screw, is adapted, through which a rod, situated between the base of the generator and the burner, is passed. It is a combination of Tobold's pocket illuminator (the shield and reflector) and Mackenzie's bull-eye condenser (the plano-convex lens).

Fig. 5.



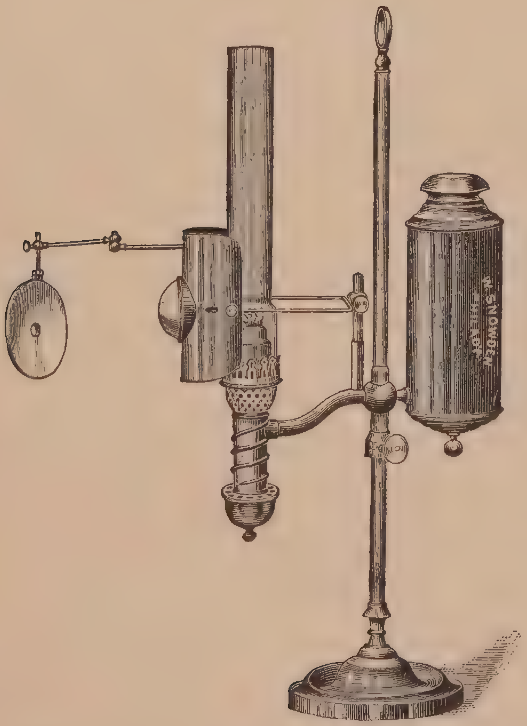
Albo-carbon light with Author's combination laryngoscopic condenser.

The albo-carbon light presents, in my opinion, many advantages over any light at our disposal excepting electricity. It is almost as white as that of the latter, radiates less heat than ordinary gas or oil, requires no attention further than the occasional renewal of the carbon as it is consumed, and is less expensive than any of the above methods.

Where gas cannot be obtained, a student lamp, furnished with an Argand burner, and the combination of Tobold's shield and Mackenzie's bull-eye condenser, described above, will serve the best purpose. In fact, this arrangement presents advantages over ordinary gas-light in whiteness and in the fact that it is portable. Good coal oil, to which a small piece of camphor has been added, will furnish a very bright and penetrating light.

The mode of attachment of the shield to the lamp is the same as that employed for the carbon generator, the perforated bail of the arms being passed over a perpendicular rod. The latter is inserted in the shade rest, instead of being attached to the stand, as in Tobold's lamp. In this manner the lamp proper is

Fig. 6.



Author's combination of Tobold's pocket illuminator and Mackenzie's bull-eye condenser.

connected with its stand by only one point of attachment, and can be moved up and down and turned on the stand shaft, without disturbing the relative positions of the light and shield.

The oxy-hydrogen light is used by a few specialists on account of its brilliancy and its white color, but it is very irregular in its action and expensive to keep in good condition.

POSITION OF PATIENT AND PHYSICIAN.

When an examination by reflected light is to be made, the patient should be seated, with the lamp, or whatever apparatus is used, standing a short distance from his right shoulder. The observer, seated in front of his patient, with one knee on each side of the latter's knees, places his eye behind the perforation in the reflector, if it is connected with the lamp, or adjusts this instrument so as to bring the hole before his eye, if the head-band arrangement is used. In order to obtain the greatest advantage of the rays furnished by the flame, the reflector must be so adjusted as to receive them accurately, that is to say, the center of the disk formed by the rays must correspond with the middle of the mirror. This fact holds good also in directing the reflected light towards the cavity to be examined. In anterior rhinoscopy, whichever fossa is to be illuminated should correspond with the center of the reflected beam, while in posterior rhinoscopy and laryngoscopy the mirror in the oral cavity should hold the same relation with it. When the forehead reflector is used, the head of the observer must consequently be held very steadily when he has succeeded in concentrating the reflected light on the desired spot.

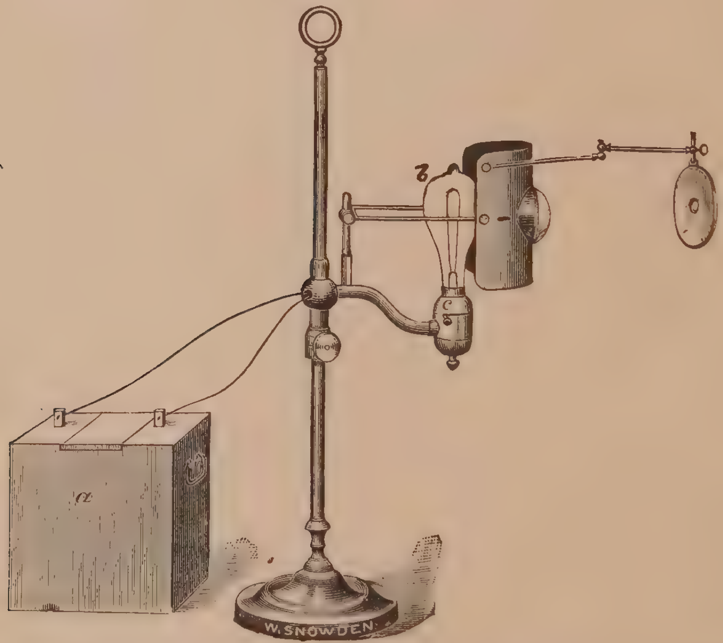
At times the patient has a tendency to move his head out of the line of vision. This can be easily mastered, by supporting his chin with the middle finger of the hand holding the tongue or the tongue depressor. A hold is thus secured on the lower jaw, through which the motions of his head can be controlled.

ELECTRICITY.

Having described the methods now at our disposal for the illumination of the nose and throat, it might not be amiss to review briefly the past and present of that light which will, at an early date, supplant them all.

As stated before, electric light was one of the agents tried by Garcia in his efforts to illuminate the larynx by artificial means. The infancy of laryngoscopy was thus associated with what will prove, in the near future, a great step towards its perfection. It was not until lately, however, that such hopes could be entertained by the enthusiastic exponents of this branch of medicine. Many drawbacks militated against its use. Galvanic batteries were not only very costly, but they required much personal attention, and the polarization of the cells made them very unreliable; dynamo-electric machines, whether furnished with simple carbon points or arc-light lamps, produced an unsteady and flickering light, not to speak of many other disadvantages. It is only since the invention of the telephone that a wholesome awakening has taken place in electric science, through which great progress has been made in electric illumination. The invention of the incandescent lamp, and the improvements in dynamos, did away with many of the objectionable features, but it is only lately that the last obstacle which rendered its employment in laryngoscopy impracticable, was overcome. The steadiness of the light had been much improved, but it was far from perfect enough to render it applicable to our purpose. Planté, the distinguished French scientist, demonstrated that electricity, generated by whatever means, could be stored for use as required, and produced his "storage battery" or "accumulator." Such an instrument had been constructed before, but its powers of retention were so limited that no practical benefit could be derived from it. Planté's "accumulator" was not only able to store electricity for prolonged usage, but it presented an advantage of the greatest importance in electric lighting; it only allowed this element to flow from its plates in a steady and regular stream, obviating completely the unsteadiness inseparable from it when run by the direct dynamo current. Since then, the efficiency of the storage battery has been much increased, and while being made more durable, its cost has been relatively much reduced

Fig. 7.



Author's lamp for electric illumination. *a* Storage battery. *b*. Incandescent lamp. *c*. Circuit closer.

Being desirous of testing the practical application of accumulators, I removed the reservoir, wick cylinder, and burner of a lamp such as that in Fig. 6, and attached a small Edison incandescent lamp to the end of the oil pipe, using the latter as conduit for the (well insulated) wires. The other parts of the instrument were not disturbed, and all freedom of motion preserved. Connecting the wires with a series of accumulators, I obtained an illumination which nothing could surpass in brilliancy. Unfortunately, such an arrangement is as yet too expensive to warrant its constant use, while the large number of accumulators necessary to overcome the resistance of the lamp makes their frequent transportation for the purpose of re-charging an annoying feature. For our purpose, the advantages of the storage battery can hardly be appreciated, and it is to be hoped that the obstacles yet militating against its general use will soon be overcome.

CHAPTER II.

ANATOMY AND PHYSIOLOGY OF THE NASAL CAVITIES.

ANATOMY.

THE ANTERIOR NASAL CAVITIES.

THE anterior nasal cavities extend from the margin of the nostrils to the anterior limit of the pharyngeal vault or posterior nasal cavity. Their *roof*, about one-quarter of an inch wide, and one inch and a half long, is formed by the cribriform plate of the ethmoid and the nasal bones; their *walls*, about one and a half inches high, slanting outwards and downwards, by the vertical plates of the palate and the nasal surfaces of the superior maxillary bones, and their *floor*, about one inch wide, by the horizontal or palatal processes of the same bones. Their general shape is that of a wedge with rounded edges. In front, the bony framework is replaced by cartilaginous plates, and that part of each of the cavities which they cover is called the *vestibule*.

The anterior nasal cavities are separated by an upright partition, the *septum*, formed by the perpendicular plate of the ethmoid above, the vomer behind, and the septal cartilage in front. These are articulated at their edges, and form a thin plate which serves as a smooth inner wall to each cavity. It is seldom perfectly straight, its center generally bending either to the one side or to the other—most frequently to the left. Its thickness, which in front is about one-tenth of an inch, increases slightly from before backwards, until it becomes one-eighth of an inch thick at its posterior margin.

The anterior nasal cavities are open from front to back. The front apertures or nostrils, elliptical in shape, are called the *anterior nares;* those facing the pharyngeal vault, broader and higher, and shaped somewhat like a pigeon's egg, the *posterior nares.*

From the wall on each side and directed towards the septum, but not touching it, stand out three horizontal, shelf-like prominences, the *superior*, *middle* and *inferior turbinated* bones. The superior, the smaller of the three, protrudes perpendicularly from the roof, and forms between its edge and the slanting wall of the nose the *superior meatus*, into which the canal of the sphenoidal sinus opens. The middle, much larger, and with its edge curled under, stands out obliquely downwards and forms the *middle meatus*, into which the *infundibulum*, the canal of the frontal sinus and the *orifice of the antrum*, immediately adjoining, have their apertures; the former being partially hidden by a projecting fold of mucous membrane, and the latter contracted to a small circular opening. The inferior turbinated bone is somewhat larger than the middle; its surface approximates more the horizontal, while the curl of its edge is more accentuated, excepting at its anterior portion, where it gradually tapers until united with the wall. The space under it is the *inferior meatus*, into which the *nasal duct*, the canal by which the lachrymal sac is connected with the nose, opens, by a somewhat expanded orifice provided with an imperfect valve formed by the mucous membrane.

The accessory cavities, with which the two upper meatuses are connected by canals, the sphenoidal sinuses, the frontal sinuses, and the antra of Highmore or maxillary sinuses, although not forming a part of the nasal fossæ proper, often become involved in the affections to which these are liable.

The *sphenoidal sinuses* are two irregular cavities, usually about the size of an acorn, separated from each other by a thin osseous lamina. They are situated immediately behind the superior meatuses, a thin plate of bone separating them from the latter. The so-called canal connecting each sinus with its adjoining meatus is a perforation through this plate, at its upper junction with the roofs of each cavity, large enough to allow the passage of a darning needle. The roof of each sinus, usually about one-twelfth of an inch thick in the adult at its thinnest portion, separates it from the base of the brain.

The *frontal sinuses*, much larger than the sphenoidal, are situated between the two tables of the skull in the frontal bone immediately over the upper and front portion of the nasal cavity, and extend some distance over each orbit. They give rise to the prominences above the root of the nose. They are irregular in shape, separated from each other by a bony partition, and are occasionally subdivided into smaller cavities by osseous laminæ. They are generally absent in children, developing and increasing in size as age advances. The bony plate forming their posterior wall separates them from the anterior convolutions of the brain, and is very thin where their antero-posterior diameter is broadest. The *infundibulum*, by which each sinus communicates with the middle meatus, is a narrow canal which begins at the junction of its floor with the inner wall, and is directed downwards and backwards.

The *maxillary sinuses* or *antra of Highmore*, are two large cavities in the bodies of the superior maxillary bones immediately adjoining the nasal cavities, the outer walls of which form their internal boundary. The floor of each antrum is formed by the alveolar process, the roots of the first and second molar teeth sometimes penetrating into it. The roof is formed by the floor of the orbit, its external wall by the facial, and its posterior by the zygomatic surfaces of the superior maxilla. The aperture by which it opens into the middle meatus is situated near its upper part and is large enough to admit the end of an ordinary probe.

The mucous membrane lining the nasal cavities is sometimes called *pituitary*, which means "phlegm producing," and *Schneiderian*, from Schneider, who first showed that the nasal secretion was produced by the mucous membrane, and not by the brain. It is continuous with the skin of the nostrils in front, and with the mucous membrane of the pharyngeal vault behind, adheres closely to the bones or cartilages which it covers, and varies greatly in thickness in the different localities. It is thickest over the turbinated bones, somewhat thinner over the septum, very thin on the nasal floor, the under surface of the turbinated bones, and the accessory cavities, to which it is distributed by continuity through the apertures by which these are connected with the nasal cavities. Its color also varies in different regions. The upper portion, called the *olfactory region*, including the roof, the superior turbinated bone, the superior meatus, the upper third of the surface of the middle turbinated and the corresponding portion of the septum, are of a yellowish pink. Below this limit, the portion called the *respiratory region*, the membrane is light pink; at the posterior ends of the turbinated bones this color assumes a whitish hue which increases in intensity when hypertrophic changes take place. In the accessory cavities the membrane is of a pale pink. The depth of coloring is influenced by the condition of the blood of the subject: in anemia, it is paler, the underlying bone giving the transparent membrane a yellowish tint in localities where it is thin; in plethora, the general color may even be dark pink, and the variations in the different regions very slight.

In the olfactory region, to which the branches of the olfactory nerve are distributed, the mucous membrane is covered by *tesselated epithelium;* below this and throughout the whole extent of the respiratory region, excepting the vestibule and the cartilaginous portion of the nose just above the nostrils, which are also covered by tesselated epithelium, the mucous membrane is covered by *ciliated epithelium*, so called because it is furnished with fine hair-like processes which possess the power of vibrating to and fro. The mucous membrane proper, immediately under these two varieties of epithelial covering, is composed of the usual elements, connective and elastic tissue, bloodvessels, muscular fibres, etc., and is traversed by the ducts of two kinds of glands, *serous* and *mucous*, which have their origin in the third or submucous layer, and their openings between the epithelial cells. Although closely distributed throughout the whole nasal membrane, they are most numerous at the middle and back parts of the cavities, and largest at the lower and back part of the septum.

The third or sub-mucous layer, lies in contact with the periosteum of the osseous walls and the perichondrium of the cartilaginous. It is principally composed of an erectile cavernous tissue, especially thick over the inferior turbinated bone and the lower part of the septum, resembling very much the corpora cavernosa of the penis, hence called by Bigelow, of Boston, the *turbinated corpora cavernosa.* It is composed of large venous sinuses, which can be suddenly filled by the capillaries which open abruptly into them, causing distension and erection.

Arteries.—The arterial supply of the nasal fossæ is as follows:—The roof, by the ophthalmic, small ramifications of which pass through the apertures in the cribriform plate, and descend a short distance down the septum and the walls of the fossæ. They also supply the frontal sinuses.

The turbinated bones, the meatuses and the septum are supplied by the spheno-palatine branches of the internal maxillary, which enter the nasal cavity by the spheno-palatine foramina at the back part of the superior meatuses, where they each divide into two branches: one internal, the artery of the septum, passes obliquely downwards and forwards along the septum, supplies the mucous membrane and anastomoses with the nasal branch of the ophthalmic alluded to above; and one external, which subdivides into two or three branches and supplies the mucous membrane covering the lateral wall of the nose, the antrum, and the sphenoidal sinus. The anterior portion of the septum is supplied by the "artery of the septum," a branch of the superior coronary, which enters the nose at the junction of the nostril with the lip. The arterial supply of the nasal mucous membrane is a close and compact network of vessels, and readily explains the copious hemorrhages accompanying operations in the nasal fossæ.

Nerves.—The nerves of the nasal fossæ are the olfactory, the special nerve of the sense of smell, which is distributed over the upper third of the septum, and over the superior and upper part of the middle turbinated bones. The middle and posterior part of the septum, the lower edge of the superior, and the surface of the middle and inferior turbinated bones, are supplied by the nasal branches of the spheno-palatine ganglion of the sympathetic, which enter the nasal cavity by the spheno-palatine foramina along with the arteries. The vidian also supplies the upper and back part of the septum and the mucous membrane of the superior turbinated bones. The upper and anterior part of the septum and the outer wall of the nasal fossæ, the anterior surface of the inferior turbinated bone and the floor of the nose, are supplied by the nasal branch of the fifth pair, which enters the nasal cavity through a slit by the side of the crista galli, supplying them with general sensibility.

THE POSTERIOR NASAL CAVITY.

The posterior nasal cavity extends from the posterior limit of the anterior nasal cavities, with the external walls of which it is continuous, to an imaginary line passing horizontally under the free border of the soft palate. Its *roof*, at first horizontal, gradually curves downward posteriorly and on each side, forming three perpendicular walls supporting a half dome which faces the posterior nares. This half dome is called the *pharyngeal vault*, and forms the top of the pharynx. Its *floor* is the upper surface of the soft palate, which is continuous posteriorly with the floor of the nose. The space between the free border of the soft palate and the posterior wall of the naso-pharynx is called the *isthmus*, which is closed, when, during the act of deglutition the velum palati is approximated to the pharynx.

The osseous relations of the pharyngeal vault are: above, the body of the sphenoid and the basilar process of the occipital bone; posteriorly, the anterior surface of the first cervical vertebra; laterally, the internal pterygoid plates of the sphenoid and the petrous portions of the temporal bones.

Its mucous membrane is continuous with that of the nose, but is furnished with a much greater number of glands. These are of two kinds, *conglomerate* and *follicular*, the former being most abundant behind the eminences containing the orifices of the Eustachian tubes on each side, and on the upper surface of the soft palate, where they are clustered together. The follicular glands form, on the posterior wall at the lower part of the vault what Luschka has named the *pharyngeal tonsil*. It is composed of follicles, more or less compactly united. Its surface is dotted by a number of small prominences, the openings of the glandulæ, and shows numerous depressions and crypts. Its thickness is about one-tenth of an inch, and it extends on each side to a deep groove, which separates it from the orifice of the Eustachian tube, called the *fossa of Rosenmüller*.

The pink color of the pharyngeal vault is somewhat darker than that of the nasal fossæ. The prominences of the Eustachian tubes, however, are of a very light pink, which becomes yellowish around the orifices.

Arteries.—The greater portion of the posterior nasal cavity is supplied by the ascending pharyngeal, which is derived from the external carotid. Its anterior portion receives the terminal branches of the spheno-palatine and the vidian already described.

Nerves.—The roof and the Eustachian prominences are supplied by the pharyngeal branches of the second division of the fifth; the floor by its posterior palatine branches, and the wall by twigs of the glosso-pharyngeal and spinal accessory, and superior cervical of the sympathetic.

PHYSIOLOGY.

The functions of the nasal cavities are the following:—they are the seat of the sense of smell; they elevate the temperature of the inhaled air, give it moisture and purify it by arresting what particles of dust or other substances it may contain; they serve as resonance cavities for the voice.

The mucous membrane covering the superior and the upper part of the middle turbinated bones contains the filaments of the olfactory nerves. It is known as the *olfactory membrane*, and receives the impression made by the odoriferous particles. In order to produce an olfactory impression the emanations of the odoriferous body must be drawn freely through the nose. When they reach the olfactory membrane they are dissolved in the secretion covering it, and are thus brought in relation with its nerves. Any morbid condition decreasing the area of the nasal cavities or inducing an absence of secretion, will consequently affect the sense of smell.

When the temperature of the air is several degrees lower than that of the blood, a slight increase in its temperature may be noticed after it has passed the nasal cavity on its way to the lungs; the greater the difference between air and blood, the more this increase will be marked, until in very cold weather, the air will have become comparatively warm before reaching the larynx. Were this not the case, the inhabitants of high latitudes could not endure the intensity of the cold. This warmth is not only communicated to the air by the very vascular and tortuous fossæ, but is also obtained by admixture with the watery secretion of the serous glands and the watery vapor exhaled by the lungs, deposited on the surface of the nasal membrane and kept warm by the underlying arterial supply. Thus its temperature is not only raised but it is also made moist and better prepared to meet the delicate bronchial surfaces.

Around the margin of the nostrils are little hairs termed *vibrissæ.* The object of these is to arrest the larger particles of dust or other foreign substances that the air might contain. Finer particles however, are not interfered with on their passage through the nostrils, but having passed these, meet the surfaces of the fossæ, made adhesive by the secretion of the mucous glands, and adhere to them. The constant to and fro motion of the ciliæ of the ciliated epithelium propels the mucus containing them towards the nostrils, and the desire to "blow" the nose is experienced.

When through loss of the turbinated bones, atrophy of the mucous membrane or other causes, the nasal fossæ become too patent, these conditions are not fulfilled, and the pharynx, larynx, and lungs, are constantly exposed to the effects of cold dry air filled with any extraneous matter that may be floating in it. Again, when the abnormal condition is one interfering with nasal respiration making mouth breathing a necessity, the same dangers are incurred, the physiological functions of the nasal cavities being completely omitted.

That the nasal cavities influence the resonance of the voice can readily be ascertained by closing the nostrils and uttering a few words. When a sound is produced, the air in the cavities, as well as that in the mouth, is thrown into vibration, and if the condition of the former is such as to not interfere with the passage of the sound waves emanating from the larynx, the oral note will be clear and penetrating, having acquired resonance and body through the additional vibration of the air in the nasal spaces. If the nose be closed either by the fingers or some abnormal condition of its walls or lining membrane, the air contained behind the seat of obstruction will also be thrown into vibration, but being imprisoned there, will not contribute to the quality of the note. The "nasal twang" will be produced and the note will be devoid of volume and character. The same degree of freedom for the passage of sound is not always required however. In the nasal consonant *m*, for instance, the cavities must be clear of all obstruction, and closure of the nostrils causes it to be pronounced *eb*, while the lingual *l* can be pronounced with nose closed with no change in the pronunciation, the sound alone being devoid of proper quality. The "regulator" in this case is the *soft palate.* When *m* is pronounced the soft palate stands some distance from the wall of the pharynx giving ample room for the combination of oral and nasal vibrations and for the free passage of the second sound of the letter, which is pronounced *through the nose.* When *l* is pronounced, the soft palate approaches the pharynx, the resonance of the cavities being only necessary for the quality of sound. If it were in the same position as for *m*, the second sound of the letter, which is entirely pronounced *through the mouth*, and is formed by pressing the end of the tongue against the front part of the palate, would not be heard, the greater part of the sound waves having escaped through the nose, without, of course, being influenced by the position of the tongue.

Purity of voice and enunciation, depends largely upon the condition of the nasal cavities and of the soft palate, and requires the absence of all obstructions of the former, or of any condition interfering with the free motion of the latter.

CHAPTER III.

RHINOSCOPY.

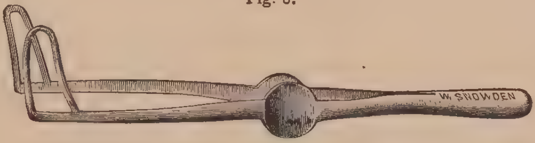
Rhinoscopy is the term applied to the optical examination of the nose. When the examination is made by looking directly into the nostril, it is called *anterior* rhinoscopy; when it is made with the aid of a mirror passed through the opened mouth and held behind the soft palate, it is called *posterior* rhinoscopy, by means of which a reflected view of the posterior aspect of the nasal passages is obtained.

ANTERIOR RHINOSCOPY.

In order to illuminate the anterior nares properly and facilitate inspection, their aperture must be dilated. Several instruments are at our disposal for that purpose, called *nasal dilators*, a misnomer, for the nostrils alone are dilated and not the nose. The instrument is correctly called by some authors "nostril dilator," a term which should replace the other. Goodwillie's, with three blades is, in my opinion, the most efficient instrument, being light and self-retaining. As originally constructed, however, it was rather inconvenient to manipulate. A firm grasp being obtained with difficulty, the instrument frequently rotated on its axis as its blades were being inserted in the nostril. Dr. Alex. MacCoy, of this city, had a finger rest placed on each lateral branch, rendering its manipulation as easy as that of any other. Another good instrument is Bosworth's, shown in Fig. 8. It is light and easily handled.

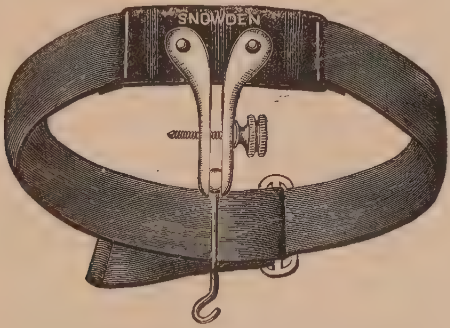
When the nose is sensitive, dilators which are opened by the spring of the blades, such as the above, give rise to severe pain, especially if allowed to open suddenly. I have added a movable threaded rod with a finger screw at each end, across the lateral branches of Goodwillie's instrument, by which the expansion of its blades can be regulated. By bending the tips of the rod, two rings are formed, one at each end, which secure the screws and serve for a hook by which the instrument can, if necessary, be connected with a head band to elevate the tip of the nose. I have also altered the shape of the blades by making their central depression much more marked and their ends more pointed. The instrument, thus modified, will be held firmly in the nostril, occasion no pain,

Fig. 8.



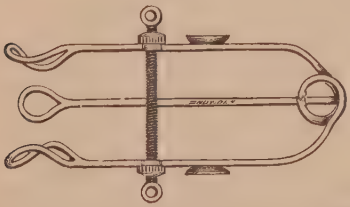
Bosworth's nostril dilator.

Fig. 9.



Author's hook to elevate the dilator and the tip of the nose.

Fig. 10.



Author's modification of Goodwillie's nostril dilator.

and be applicable in all cases, thus avoiding the necessity of a set of different sizes. It should be manipulated with one hand, the thumb and middle finger pressing on the finger rests, and the index regulating the screw.

Although apparently easy, the manipulation of a nostril dilator requires much care. The instrument is designed exclusively to expand the membrano-cartilaginous part of the nostril; if it were allowed to enter beyond this and to reach the isthmus formed by the unyielding cartilaginous septum and the nasal margin of the ascending branch of the upper maxillary bone, it would cause pain without dilating in the least the opening between them. It should never be inserted deeper than one-half inch, a quarter of an inch being sufficient in most cases. One blade should rest under the tip of the nose and the other against the edge of the floor of the nose. The parts will not be distorted as when the blades are applied one against the lower edge of the septum, and the other against the soft cartilaginous wing. The shape of the aperture will facilitate the penetration of light and the introduction of instruments, and the dilator will be held firmly. Goodwillie's presents an advantage here, its third or middle blade pressing against the wing just sufficiently to increase the lateral diameter of the opening, without disturbing the relation of the parts to each other.

The patient's head being tilted backward so as to bring the axis of the nasal cavities on a line with the observer's eye, the light is directed into the nostril to be examined. The blades of the dilator are then inserted, and when in the proper position allowed to open gently. If a regulating screw be connected with it, the expansion of the blades can be arrested as soon as the nostril is dilated sufficiently and the instrument retained by its resiliency.

It is sometimes necessary to raise the tip of the nose to increase the field; this can be done, either by tilting the dilator upward, or by resting the fingers against the forehead and raising the tip with the thumb. This will enable the observer to rotate the head of the patient and bring successively all the different parts of the cavity to be examined under the light. In operations, it is sometimes necessary to keep the nose tilted upward for some time, not only to facilitate illumination, but also to give the operator the freedom of his hands and more working space. The hook shown in Fig. 9 will be found very convenient. It is adaptable to any reflector head-band, or may be connected with a piece of tape attached around the patient's head.

An ordinary probe is very useful in anterior rhinoscopy to ascertain the conformation of prominences, their density, the relation of parts to each other, etc.

THE ANTERIOR RHINOSCOPIC IMAGE.

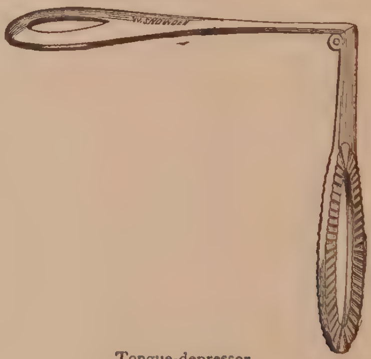
The image brought to view by anterior rhinoscopy is generally a limited one. In exceptional cases, especially in those where the septum is strongly deflected to one side, or where atrophy of the lining membrane has taken place, the entire surface of the nasal cavity can be seen, including that part of the pharynx above the line of the palate. But in ordinary cases, the view can be much extended by moving the head in different directions. With the head in the position described in the preceding paragraph, the parts seen will be the anterior portions of the middle and inferior turbinated bones on one side, and the wall of the septum on the other. Tilting the head backward somewhat more, the middle turbinated bone will be seen more extensively, while the roof, the superior turbinated bone, and the anterior portion of the nasal cavity will come into view. Lowering the head will cause an entirely different image, the middle turbinated and all above it disappearing from view, and the inferior turbinated, the inferior meatus, and the floor of the nose coming into full sight. In their normal condition, these parts are light pink, with the exception of the superior turbinated bone and the roof of the nose, which are yellow. When seen by a yellow light the pink becomes darker, approximating red. This should be borne in mind in making a diagnosis.

POSTERIOR RHINOSCOPY.

The instruments necessary for examining the posterior aspect of the nasal cavities are, a tongue depressor, a post-nasal mirror and sometimes, a palate elevator.

Of tongue depressors, of which there are many kinds at our disposal, that shown in Fig. 11 is the most satisfactory. It is heavily nickel-plated, easily kept clean, and takes firm hold of the tongue by encircling within the fenestra in its blade, a bulging portion of the surface of that organ.

Fig. 11.



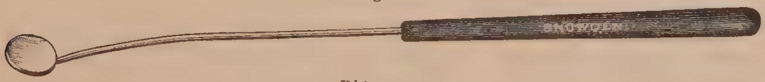
Tongue-depressor.

In introducing the tongue-depressor it should be borne in mind that the organ at once resists rude treatment, and that pressure on the papillæ circumvallatæ causes violent retching in most cases.

The patient is requested to open his mouth and the light is directed into it. The instrument, held firmly (Fig. 13) with the thumb resting just behind the hinge, is then introduced, and when the blade covers about *two-thirds* of the tongue, firm pressure is exerted, the tip of the instrument being made to revolve in the arc of a circle with its center at the teeth. Sometimes, much difficulty is experienced in depressing the tongue. The organ will arch itself to a degree that will make it appear as if it were four times its normal size, or its tip will rest behind the lower incisors, and the dorsum will ascend to the hard palate, completely preventing a view of the pharynx. This is sometimes due to fear, at other times to inability to control its movements. After a first effort, the patient should be allowed to rest for a few moments, then requested to open his mouth without moving his tongue, that is to say, to keep it in the position it held when the mouth was closed. This will generally succeed. If it does not, the only way to depress it, is to fatigue it by continued pressure. The rigid muscles will soon give way.

The rhinoscope is a small plane mirror mounted on a wire stem and furnished with a handle. Several sizes are made, but the size generally preferred is the No. 1 mirror, the diameter of which is one-half inch. The stem is curved somewhat, the line followed being that of the surface of the tongue. The object of this is to enable the observer to hold the mirror below the plane of the soft palate (which would otherwise interfere with the view) without causing the hand holding the instrument to stand in the way. The mirror must be held with its surface slanting somewhat towards the observer, so as to enable him to see the reflected image, while at the

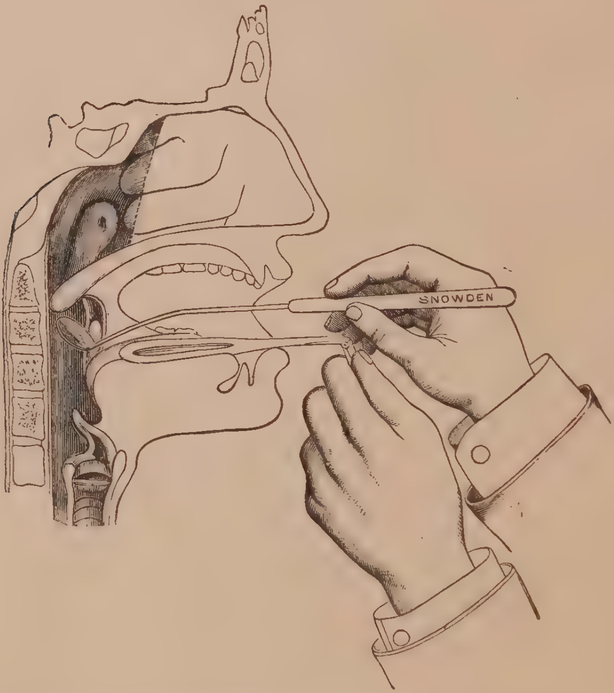
Fig. 12.



Rhinoscope.

same time illuminating the point examined. This brings its lower edge behind the tongue, and the distance between that organ and the pharynx being rather less than one inch, if the diameter of the mirror were greater than it is, its upper edge would touch the pharynx and its lower the base of the tongue, causing retching and gagging.

Fig. 13.



Rhinoscope and tongue depressor in position.

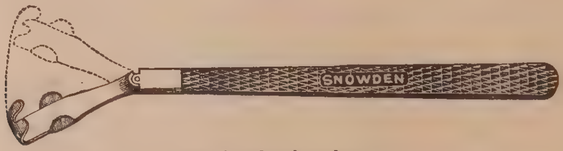
Occasionally, through congenital malformations, destructive metamorphoses, etc., the soft palate is either absent, or in such a condition that a larger mirror can be used. These opportunities should always be taken advantage of, a complete image of the posterior nares being seldom obtainable.

The first requisite for making a satisfactory examination of the posterior nares is to depress the tongue properly, exposing as much as possible of the wall of the pharynx. In order to leave the right hand free, the tongue depressor should be held with the left hand. The mirror, held like a penholder, is then heated by exposing the *glass* surface over the light for a second or two, and having ascertained, by pressing its *metallic* surface on the back of the hand holding the tongue depressor, that it is not too hot, it is entered into the mouth with its reflecting surface looking upwards and forwards, and advanced in the oral cavity, avoiding the soft palate and the base of the tongue, until its upper edge nearly touches the pharynx proper. When the mirror is in position the shaft is rested against the corner of the mouth to insure stability. If all conditions are favorable, the light well directed, the patient's throat not too irritable, and the rhinoscope held at a proper angle, that portion of the posterior nares towards which the rhinoscope reflects the rays of light will be illuminated, and will appear in the mirror.

A satisfactory view can only be obtained when the soft palate hangs free from the pharynx. When the mouth is opened for examination, there is a tendency on the part of the patient to breathe through it, the velum palati and uvula in this case applying themselves tightly against the pharyngeal wall, shutting off all communication between the nose and the oral cavity. Generally, if the patient be directed to breathe through his nose, his efforts will cause the soft palate to fall, bringing the posterior nares into the field of the mirror; sometimes, however, they will not, in which case a nasal sound such as the French word *en* may be tried, as suggested by Czermak. If these means fail, a ten per cent. solution of cocaine, applied with a brush to the soft palate, the pharynx and the base of the tongue, will render the use of the palate elevator possible, and subdue all irritation.

The palate elevator is also useful when an hypertrophied uvula interferes with the view. The hook is passed behind the palate and the uvula doubles itself anteriorly between the raised sides of the blade. The hook is connected with the handle by means of a hinge, which enables it to be bent laterally and to be held with either hand without interfering with vision.

Fig. 14.



Author's soft-palate elevator.

THE POSTERIOR RHINOSCOPIC IMAGE

What is called the posterior rhinoscopic image is only seen in its entirety, when, through a particular fitness of the parts a large mirror can be passed behind the soft palate. In ordinary subjects, however, only the small mirror shown in Fig. 12 can be used. Occasionally the lateral half of the posterior nares can be seen, but generally only portions of it can be brought into view at one time. Whatever can be seen must be noted mentally, and the image constructed by the proper combination of the parts examined. Unless the surface of the mirror be held exactly on a plane with the parts before it, the image will be distorted and confusion result if the observer be not very familiar with the general conformation of the posterior nares. These difficulties make a post-rhinoscopic examination a rather difficult procedure, requiring on the part of the observer not only a thorough anatomical conception of the parts, but also great care in conducting his manipulations.

The rhinoscope being in position on either side of the uvula, the first object to appear in it, near its lower edge, will be the profile of the upper surface of the soft palate. Above it, and somewhat in the background, the half of the posterior nasal image will come into view, with the septum, broad above and tapering to a narrow edge as it approaches the floor, as internal boundary, and the prominence of the Eustachian tube, as external. These are excellent points of demarcation, being the first to strike the eye of the observer by their yellowish hue, which contrasts with the pink of the surrounding parts. Between them, and with its lower border slightly impinged upon by the Eustachian prominence, appears one of the posterior nares, shaped somewhat like, and about the size of a pigeon's egg, and surrounding like a frame the posterior ends of the three turbinated bones. The end of the inferior turbinated bone looks more like a rounded, pinkish-white mass lying in the lower and outer corner of the narium, than like the end of a surface likened to a slanting shelf; this is due to the fact that it gradually thickens as it advances posteriorly, and that its bulging portion only can be seen, while its edge, which is almost in contact with the floor of the nose, is hidden from view by the Eustachian prominence. The middle turbinated, of the same color, appears just above the inferior, a narrow shadow separating them. Its outline is better defined, and the interval between its margin and the septum wider. At its point of contact with the external wall, it is about a quarter of an inch thick, but it gradually tapers and curves downward, until its internal edge is lost to view behind the inferior turbinated. The superior turbinated is more difficult to see, its position causing it to be poorly illuminated. Its color is yellowish, and the curve of its surface much less evident than that of the middle. It appears as if hanging from the roof of the cavity, and is deeply imbedded in shadows.

If now the handle of the rhinoscope be elevated somewhat, causing the mirror to incline nearer the horizontal, the almost red, dome-like cavity of the vault of the pharynx will be brought into view, its glandular character rendering its surface irregular and furrowed.

Elevating the handle a little more, the image will be completely changed, the parts posterior to the anterior portion of the vault now appearing reversed. The wall of the pharynx, just above the mirror, will appear near its upper margin, its smooth dark pink surface gradually becoming grooved and indented, until an irregular profile outline is reached, made evident by a deep shadow which forms the background. The outline is that of the lower edge of the pharyngeal tonsil if this is enlarged, or the bulging produced by the body of the first vertebra, if it is not. The background is the cavity above, which is not illuminated. If the mirror be now drawn away from the pharynx a line or so, the handle being tilted upward a little more, a good view of the vault will be obtained in most cases. When the palate elevator is easily tolerated by the parts and the uvula and velum palati are raised or retracted from the pharynx, the mirror can be placed in the middle line, and the opening of the pharyngeal bursa, a deep depression in the pharyngeal tonsil, distinctly seen.

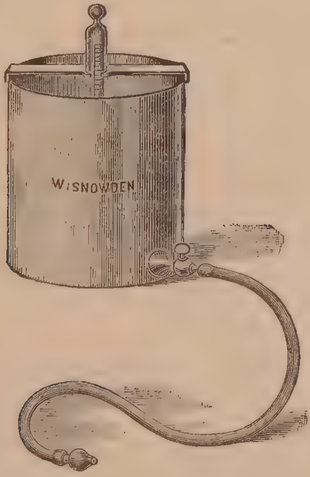
CHAPTER IV.

INSTRUMENTS USED IN CLEANSING AND MEDICATING THE NASAL CAVITIES.

This chapter will be devoted to the consideration of instruments used in cleansing and medicating the anterior and posterior nasal cavities, leaving those required in operative or special procedures to be described under the headings of the affections in which they are required.

The Douche.—The instrument generally called the "nasal douche" is a cylindrical vessel either made of glass or of tin, of a capacity of from one to two pints (Fig. 15). Its side is perforated near the bottom for the attachment of a piece of rubber tubing furnished at its free end with a nose piece, so shaped as to close the nostril like a stopper when held firmly against it. In order to regulate the flow of liquid, a stopcock

Fig. 15.



Nasal douche with Author's thermometer attachment.

is connected with the small opening of the vessel, while an ordinary bath thermometer, suspended in the center of the instrument, serves to indicate the temperature of the fluid.

When in use the instrument is filled with the solution required, and the nose piece is adapted to the nostril. The head is tilted forward, the stopcock turned on, and the vessel raised to a level with the forehead, which will cause the liquid to flow, by gravitation, through one nasal fossa and fill the posterior nasal cavity. Breathing through the mouth having caused adaptation of the soft palate to the pharynx, the fluid will pass out of the other nostril. The whole tract is thus thoroughly bathed, and cleansed of what desiccated mucus, pus, etc., may have collected there, and what remains become so softened as to be easily gotten rid of subsequently.

Some prejudice has arisen against the use of the nasal douche, through the fact that in conjunction with its employment, inflammation of the Eustachian tubes has taken place, followed in some cases by the gravest results. I will here state that, notwithstanding the large number of cases in which I have prescribed it in hospital and private practice, I have yet to see any deleterious effect following its use. There is no doubt, however, that it can do much harm if prescribed indiscriminately and without giving the patient careful directions. Several conditions must be observed, which, neglected, make it a dangerous instrument.

1. *A positive diagnosis of the case must be made.*

2. *The liquid must not be colder than 90° F.* The nearer the temperature of the blood is approached the better; but again, it must not be much above that, because the mucous membrane is exposed to the atmosphere as soon as the application is ended, and the relative difference between the ordinary heat of the nasal cavities and that of the air is increased, producing the same effect as exposure to cold.

3. *The liquid should not be forced through the nasal cavities with too much power*, not only on account of the vigorous friction to which the membrane would be exposed, but because the cavity through which the liquid escapes from the nose might not be quite as large as that through which it enters, and a certain amount of resistance might be established, by which the liquid would be forced into the Eustachian tubes and the accessory cavities. Holding the vessel with its bottom on a plane with the forehead suffices to produce a stream well calculated to bathe gently the nasal passages, and not powerful enough to penetrate into the surrounding cavities, should any cause of interference with the egress of the liquid be present.

4. *Swallowing should be carefully avoided while the douche is being used.* This act, inducing temporary dilatation of the Eustachian tubes, would cause the fluid to penetrate into them. The cases in which middle ear troubles were reported as being caused by the use of the douche, were probably due to neglect of this rule.

5. *The liquid should always be rendered alkaline*, to imitate, as much as possible, the secretion of the mucous and serous glands in density and reaction. Bland or acidulous liquids give rise to severe smarting, and cause congestion and distension of the mucous membrane. Bicarbonate of sodium, biborate of sodium, and chlorate of potassium, are the best agents for the purpose, one teaspoonful of either being thoroughly dissolved in a pint of water.

When crusts of desiccated mucus fail to become detached by the gentle current of the douche used anteriorly, it should be applied posteriorly, that is to say, by passing a curved nozzle connected with the instrument behind the soft palate (see Fig. 16), and directing the stream of liquid towards the vault and posterior nares. But here again, certain precautions are necessary in addition to those enumerated for the application of the douche anteriorly.

The perviousness of both anterior cavities should be ascertained and the quantity of liquid thrown in limited to the amount that can readily pass out. This can be regulated by the stopcock. Were this neglected, and some condition or other inducing complete or partial stenosis be present, the fluid would regurgitate into the mouth and perhaps into the larynx.

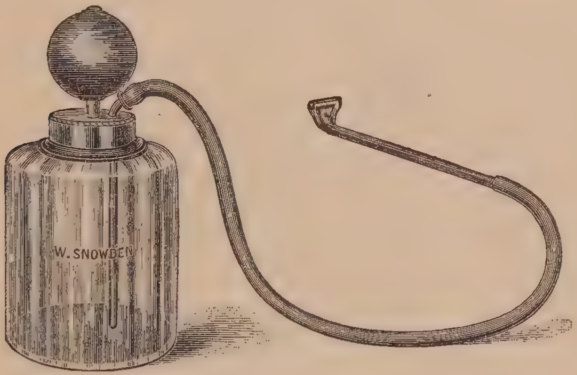
The head should be tilted forward as much as possible, so that in case any fluid should perchance regurgitate, it could find an easy egress through the mouth without endangering the larynx.

While in charge of Dr. Cohen's practice some years ago, I had occasion to use, in connection with a douching apparatus, a neat little curved nozzle devised by him, which for simplicity and usefulness is surpassed by none. It consists merely of a piece of glass tubing eight inches long, with one end flattened and bent, as shown in Fig. 16. By adjusting the straight end to the rubber tube of the douche, a convenient handle is formed, and the flat fan-shaped tip can be easily passed behind the soft palate and held there by the patient.

I have used one of these tubes ever since. The stream formed is also fan-shaped, and by alternately raising and lowering the end engaged in the rubber tubing, the fluid will bathe the whole surface of the cavities and propel before it what substances may have become detached. The patient readily learns how to manipulate it, although occasionally some cases are met with in which an hypersensitive pharynx seems to preclude its employment. After a few efforts, however, the parts will generally become more tolerant, not only rendering posterior douching possible, but also greatly facilitating subsequent rhinoscopic examinations by accustoming the parts to manipulation.

Occasionally a more forcible current is required to remove desiccated crusts of muco-pus which resist the gentle pressure of the douche, even when this pressure is increased by raising the vessel as high as the length of the rubber tube will permit. A very effective instrument for that purpose is that known as "Hall's syringe" (Fig. 16), a glass jar surmounted by a bulb, with a valve between them. When this bulb is pressed upon, the air contained in the jar is compressed, and the liquid is forced up a perpendicular glass tube, which connects externally with a piece of rubber tubing such as that attached to the douching apparatus. A continuous stream is thus obtained, the force and rapidity of which can be nicely regulated by the amount of air forced into the vessel.

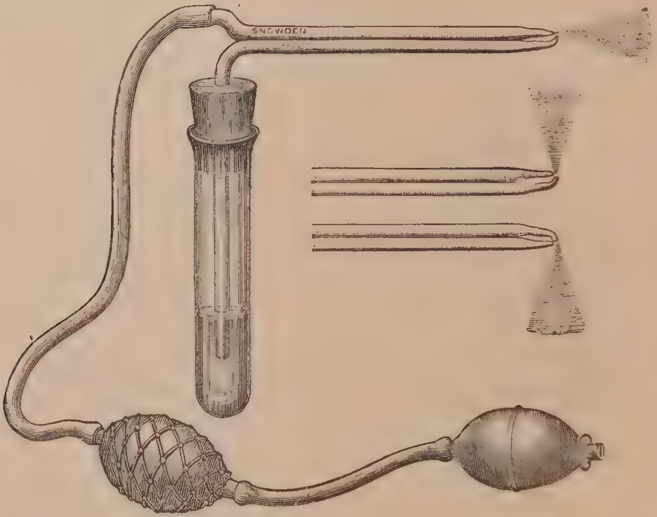
Fig. 16.



Hall's continuous-stream syringe, with Cohen's post-nasal tube attached.

In the many cases of nasal affections in which the douche is contra-indicated, a spray-producing arrangement will best suit for cleansing purposes; but the spray must be somewhat coarse. Sass' tubes, shown in Fig. 17, answer the purpose perfectly, and can be used anteriorly or posteriorly. They are made of glass and of hard rubber, and are simple in construction. Each instrument consists of two tubes, one superposed on the other; the lower one dips into the solution and the other is connected with a double bulb arrangement, as shown in Fig. 17. Their free ends are pointed and meet in such a manner that when air is forced through one tube, that in the other is exhausted, and the liquid takes its place by atmospheric pressure. When the liquid appears at the opening, the current of air from the other tube breaks it up into spray or atoms (hence "atomizer") and carries it along in that condition in the direction it follows.

Fig. 17.

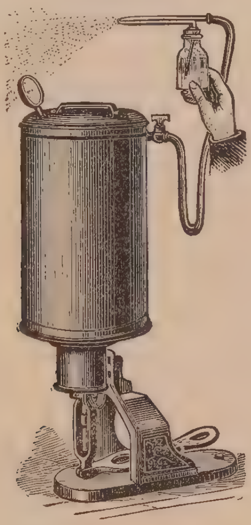


Sass' spray tubes.

A single bulb can be used, but the current, following the motion of the hand, is intermittent, which is not the case with the double bulb arrangement, the middle one serving to store the air and keep up a continuous current by its elasticity.

In special practice, however, the rubber bulb apparatus is rather inconvenient and tiresome when handled frequently. A compressed air pump of some kind is much more desirable. Among other advantages, it gives the freedom of one hand, with which the tongue depressor or the nostril dilator can be manipulated. The most convenient instrument for the purpose is Burgess' air compressor (Fig. 18). It consists of a metallic cylinder, into which air is forced by means of a little pump, worked by the foot. A pressure gauge is connected with it, which enables the operator to note and regulate the degree of pressure. The air reaches the atomizer through a rubber tube attached to a stopcock, which is connected with the cylinder near its upper edge.

Fig. 18.



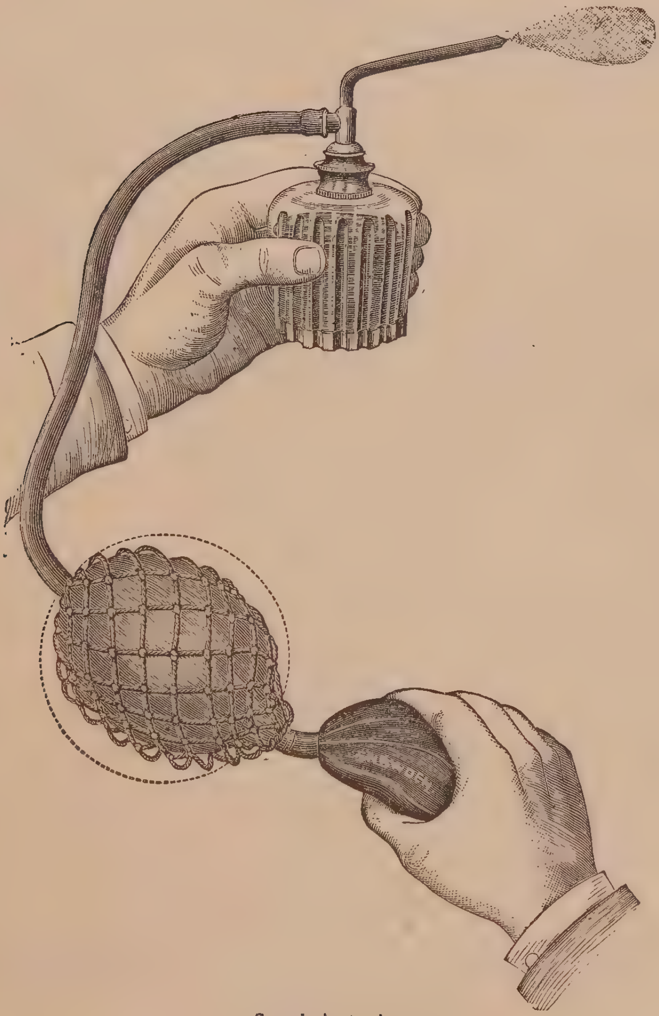
Burgess' air compressor.

The manipulation of the atomizer, although easy, should be attended with great care. If used carelessly, but a small quantity of the spray penetrates into the nasal cavities, the greater part of it condensing on the parts nearest the tip of the instrument. For the anterior nares the tip should be introduced a short distance, and the direction of the spray varied by raising or lowering the vessel containing the liquid, the anterior edge of the nasal floor acting as resting point and pivot. For the posterior nares, the two hands being required, if a rubber bulb is used, its manipulation can be entrusted to the patient. The tongue should be depressed and the tip of the atomizer held behind the uvula. Frequently, as soon as the spray is started the soft palate is drawn upward against the pharynx. The palate elevator (Fig. 14) might then be used, or the patient be directed to close his mouth around the tubes. Being forced to breathe through the nose, the soft palate is relaxed, leaving ample space behind for the passage of the spray. The head should be tilted forward, not only to facilitate the egress of the condensed liquid through the anterior nares, but also to increase the size of the isthmus. The atomizer should be held in the right hand, with the rubber tube resting between the bottle and the thumb. The rubber bulb being then compressed, or the stopcock of the air-compressor turned on, the air will fill that portion of the rubber tube between the bulbs or compressor and the thumb. The tip of the spray tube being then properly located, the thumb is raised, giving way to the passage of air. When it is desirable to stop the spraying, pressure is again exerted on the rubber tube and the current arrested.

In some cases, when, through malformation or the presence of anterior or posterior hypertrophies, polypi, etc., the spray used in the ordinary way cannot reach certain parts of the cavities, it is necessary to introduce the tube much beyond the usual depth. Fig. 19 represents an instrument which I have used for a number of years to great advantage. It can be used with rubber bulbs or the air-compressor. Unlike the other atomizers, it has only one tube, the air being forced up through it and broken up into spray while passing through the tip-hole, which is very small, or through a series of minute holes which penetrate its upper surface for perpendicular irrigation, as suggested by Dr. Rumbold, of St. Louis.

Occasionally, a comparatively straight and wide inferior meatus renders it possible to introduce the end of the tube as far as the posterior nares, and to spray the pharyngeal tonsil directly. When practicable it should always be done, as the crypts and lacunæ are better cleansed of their secretions by direct sprays, than when these are directed from below.

Fig. 19.



Snowden's atomizer.

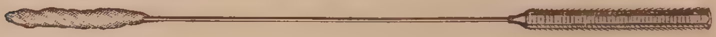
The instruments used for cleansing the anterior and posterior nasal cavities can also be employed to apply medicated liquids, but with the atomizers, care must be taken that the solution used be perfectly free of all sediments or solid particles that might render the tubes impervious by closing their apertures. Chemical action on metallic tubes produces the same effect when strong solutions are employed.

For the application of solutions in small quantities, we have the brush, the sponge, and the cotton pledget.

I have long ago abandoned the use of the brush. Besides being inconvenient and uncleanly, it does not fulfill its object. The sponge is not much better, presenting the same objections, besides that of being difficult to hold in the grasp of an instrument. By far the most convenient in my opinion is the cotton pledget, its value being much enhanced by the excellent absorbent cottons now at our disposal. A small piece can be used for each application, then burnt.

For applications to the anterior nares the delicate probe shown in Fig. 20 is much used as a cotton carrier.

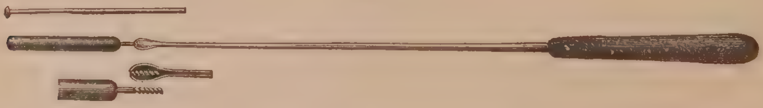
Fig. 20.



Harrison Allen's cotton carrier.

About one-half inch of the end of the instrument being roughened, a thin film of cotton is merely wrapped around it. It adheres well, and can be made to form so little volume around the end of the probe that it can be introduced in any part of the cotton cavity.

Fig. 21.

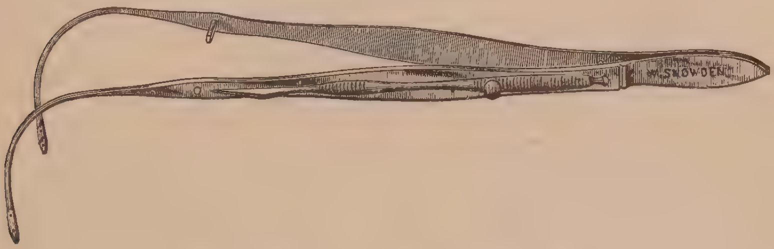


Swift's cotton and bougie carrier.

I have been using of late, a neat little instrument shown in Fig. 21 which serves very conveniently as a probe and as a cotton holder, and is especially adapted for the introduction of medicated bougies. A threaded pit at the rounded extremity enables the operator to introduce the end of a soft copper pin, which also becomes threaded and is held firmly *in situ.* The pin serves for the cotton or for the bougie, and can be easily taken off and thrown away with either after being used.

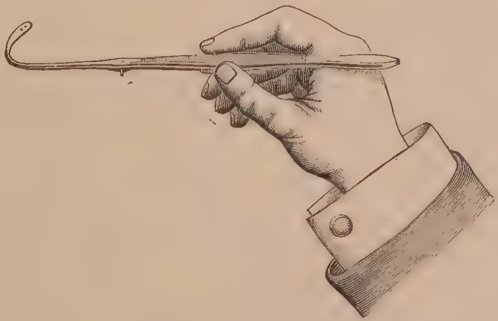
For posterior nasal applications, the instrument shown in Fig. 22, a modification of Cohen's laryngeal forceps serves me better than any. It is simple in construction, and its method of locking makes it perfectly secure, while its curve renders it available for applications to the posterior nares or any part of the pharyngeal vault. Its claws are armed with teeth which penetrate through the cotton pledget, holding it with absolute security. The instrument should be held as

Fig. 22.



Author's modification of Cohen's laryngeal forceps.

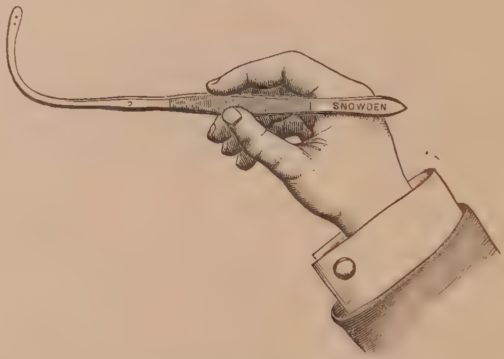
Fig. 23.



Position while in the mouth.

shown in Fig. 23, *i. e.*, like a pen. To introduce it the tongue should be depressed, and the instrument being held horizontally, its point is advanced in the mouth until almost against the pharynx. When under the isthmus a slight turn of the hand will cause the tip to turn upward and enter the posterior nasal cavity. Here its position can be modified so as to touch the desired spot by altering the relative position of the body of the instrument.

Fig. 24.



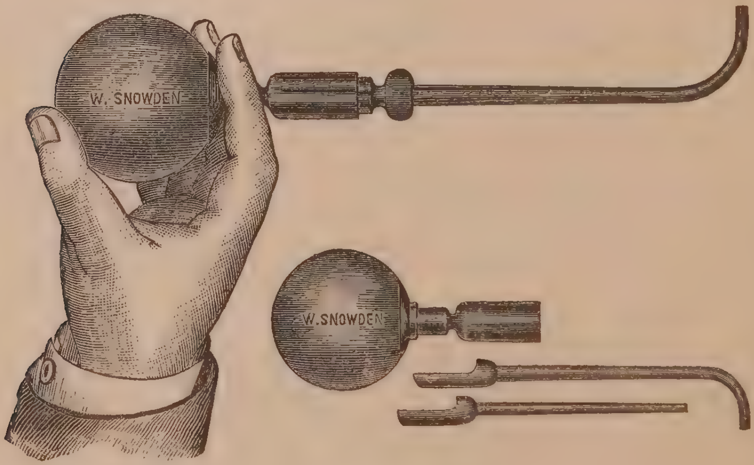
The instrument turned upward behind the soft palate.

At times the soft palate tightly closes the isthmus, rendering the introduction of the forceps impossible. The patient should be requested to breathe through his nose, a very difficult matter to some persons; but the mere effort generally succeeds in detaching the soft palate from the pharynx only for an instant, of which advantage must be taken, and the tip passed up behind it. If this does not succeed the French word *en* may be tried. If this also fails, the forceps should be left *in situ* and the mouth closed on it. The patient being then directed to take a deep breath, the soft palate will of necessity leave the pharynx, and allow the tip of the instrument to be introduced by rotating the latter on its axis. The same difficulties are sometimes encountered in extracting the forceps, the soft palate grasping the instrument tightly. The same means as for the introduction can be resorted to, great care being taken not to extricate the instrument roughly. When possible, the rhinoscope should be used to guide the application, the tongue depressor being held by the patient.

It might not be amiss to say a few words in reference to the manner in which the cotton pledget should be folded before engaging it in the instrument. A piece about an inch long and half an inch wide, is spread out between the fingers, then doubled up twice. It is then folded crosswise once and engaged between the teeth of the forceps longitudinally. If the application is to be made to a small spot, it must be folded tightly; if on the contrary, a large surface is to be covered, a less dense pledget will absorb more of the liquid. In using strong solutions, care should be taken to fold the cotton tightly, lest muscular contraction during the application should cause the fluid to flow along the pharynx and irritate adjacent parts.

For the application of powders to the nasal cavities, the instrument shown in Fig. 25 is the most convenient. It consists of two hard rubber tubes fitting into each other and furnished with a rubber ball. The end piece is either bent at its extremity, to adapt it for carrying the powder into the posterior nares or when turned downward into the larynx, or straight, for insufflations into the anterior nares. The extremity fitting in the piece connected with the rubber ball is shaped like a scoop, with which the powder is taken up. The scoop being fitted into the cavity of the other tube, the instrument is ready for use. It is then held, as shown in the cut, by resting the thumb behind the rubber bulb, and the middle and index fingers in front of it with the tube between them. The insufflator being placed in the desired position, a sudden pressure on the bulb will drive the air through the tube, and carrying the powder before it, deposit it upon the part to be medicated. For the anterior nares the straight end-piece should be used and introduced about one-half inch. The inspiratory act can be taken advantage of if the whole nasal tract is to be covered with the powder, this of course only applying to the use of non-irritating substances. If the application is to be limited to the anterior portion of the nose, the patient should refrain from breathing during the insufflation. For the posterior nares the manipulation is the same as that for the cotton forceps, the same rules holding good when the velum palati interferes with the application.

Fig. 25.

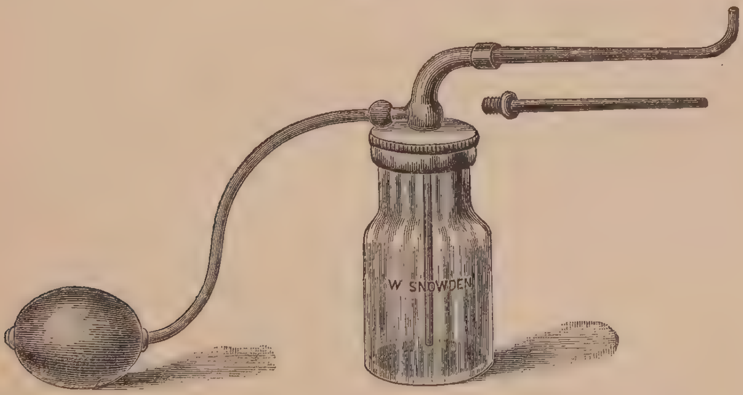


The scoop insufflator.

The insufflator shown in Fig. 26 was devised by Dr. A. H. Smith, of New York. Its construction is much like that of the single hand ball atomizer, the tubes being larger. When the air bulb is pressed, the powder is stirred up and a small portion of it is forced out through the mouth-piece and deposited on the spot to be medicated, in the form of a fine evenly diffused film. This is a great advantage possessed by no other instrument of the kind. Unfortunately it requires the use of both hands, and the amount of powder cannot be regulated. By connecting it with the air-compressor, shown in Fig. 18, the first disadvantage can be avoided, while the second can be much reduced by using substances in which exact dosage is not of prime importance, such as iodoform, boracic acid, tannin, etc.

The manner in which an insufflator is used influences greatly the value of the application. Merely blowing its contents into the cavity will naturally cause the powder to be deposited over a limited surface, but if instead of one puff, this be divided into three or four light ones, each time altering the direction of the instrument, the area covered will be much increased, and comprise the entire surface of the cavity treated if the manipulation is carefully conducted.

Fig. 26.

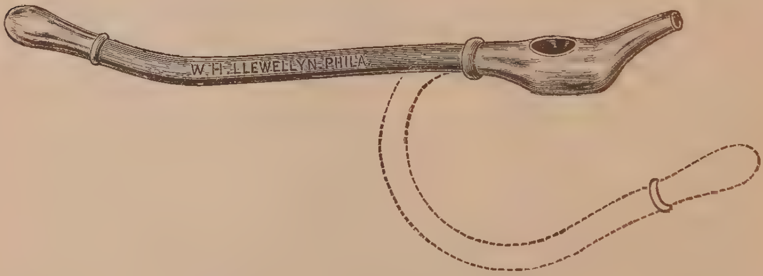


Dr. A. H. Smith's insufflator.

When insufflators are to be used by the patient, the little instrument shown in Fig. 27 will be found very effective. It consists of a piece of glass tubing two inches long slightly bent and expanded in the middle, with the convexity flattened below and roughened. The upper surface has an opening for the insertion of the powder. A piece of rubber tubing, furnished with a glass mouth-piece, is attached to it, by means of which the patient can insufflate into his own nose; if a child, the mouth-piece can be used by the mother or by an attendant. The powder having been placed in the glass cup, the latter is held with the end of the index finger on the opening, thus closing it up, and the thumb resting on the roughened surface below. The tip being then passed into the nostril and the mouth-piece inserted into the mouth, two or three light puffs will propel the powder and distribute it over the mucous lining.

The same instrument can also be used with advantage to insufflate the fumes of volatile substances. A piece of absorbent cotton the size of a small chestnut is introduced through the aperture on the upper surface and a few drops of the agent used are poured on it. The aperture is then closed with a stopper, and the instrument is manipulated as for powders, the insufflations being prolonged and repeated.

Fig. 27.



Author's nasal insufflator for the use of patients.

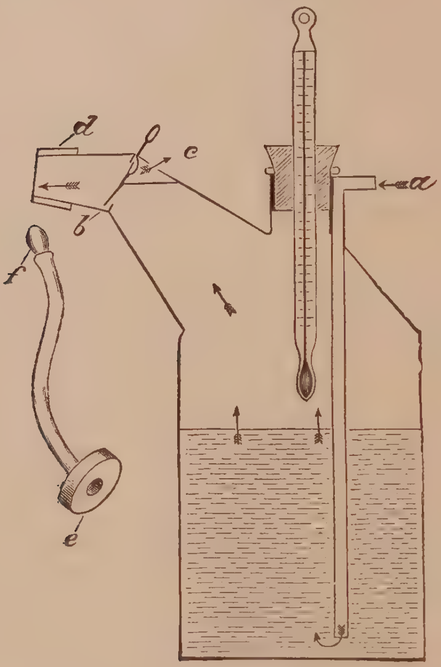
Applied in this way, the emanations of volatile drugs are distributed throughout the nasal fossæ in a more effective manner than when inhaled, the respiratory current not interfering with the dissemination of the vapor. The act of blowing through the mouth necessitating close adaptation of the soft palate to the wall of the pharynx, the isthmus is tightly closed, and the nasal cavities are completely isolated. They can thus be filled with the fumes of the drug used, and the contact of the latter with the membrane can be prolonged for a considerable time by continuing to breathe through the mouth. An advantage accompanying these auto-insufflations is that the current of air acting as a propelling agent is well prepared to meet the inflamed surfaces, being supplied with heat and moisture and absolutely free of extraneous particles.

In the treatment of catarrhal affections of the Eustachian tubes, I have found it very effective. By closing the nostrils tightly with the fingers, the tip of the instrument being inserted on either side, inflation of the tubes can not only be performed, but these can be kept open and exposed to the effects of the medicinal vapor for a considerable time at each sitting by continuing the expiratory effort acting as mechanical force, as long as possible, *i. e.*, until the breath is exhausted. This is repeated several times in succession. Renewed two or three times daily, this procedure leads to a much more rapid recovery than by the methods usually employed.

Inhalations of medicated steam are sometimes very useful in the treatment of nasal affections. The inhaler shown in Fig. 28 combines all the advantages of instruments of that kind, and introduces a simple device by means of which the medicated steam can be made to enter the Eustachian tubes and the accessory cavities. The cut represents the instrument as it would appear were it exactly divided perpendicularly.

It is made of tin plate, and of the capacity of one pint; *a* is a tube for the entrance of air; *b*, an opening of the same diameter as that of the tube *a*, for the egress of the air along with the steam; this opening is covered externally by a valve, which is raised by the current of air and steam as these are inhaled, and closed by the exhaled current; *c*, is another opening also covered by a valve, which is opened in expiration and closed in inspiration. When an inhalation is taken, the air rushes in at *a*, passes through the medicated liquid, and out along with steam through *c*, raising the large valve. In exhalation, the air is blown back into the mouth-piece, and out of the upper and smaller opening, *c*, into the surrounding atmosphere. A thermometer passing through the stopper indicates the temperature of the steam.

Fig. 28.



Author's inhaler.

For the treatment of the nasal passages, an attachment is adapted consisting of a stopper, *e*, fitting exactly into the mouth-piece, and through which a rubber tube is passed. This tube is furnished at its distal end with a perforated glass ball, *f*, which, when applied to either nostril, closes it hermetically. A few *shallow* breaths are sufficient to fill the nasal cavities with the medicated atmosphere.

When the Eustachian tubes or the accessory cavities are implicated in the affection, the medicated steam can be caused to penetrate into them by reducing the size of the expiratory opening. For this purpose the latter is furnished with a "regulator" by means of which its diameter can be increased or diminished at will. The expiratory effort meeting with resistance, forces the inhaled medicated atmosphere into them.

CHAPTER V.

THERAPEUTICS OF THE NASAL CAVITIES.

The first essential in the treatment of the nasal cavities is cleanliness. Its importance is such that its proper observance is sometimes sufficient to bring about a cure without the assistance of remedies. This is especially the case when the inflammatory process is kept up by constant exposure to an atmosphere loaded with extraneous substances in such quantity as to overwhelm the physiological functions of the ciliæ of the ciliated epithelium, and interfere with the action of the glands. Generally, however, it only forms a part of the treatment. When the patient presents himself, his trouble, in the great majority of cases, is of long duration, and inflammatory changes have already taken place, giving rise to hypertrophies, superficial or deep ulcerations, etc. The former, by interfering with the discharge of the secretions, cause their accumulation in the recesses of the cavities, where, by the evaporation of their watery constituents, they become converted into fetid crusts. The purulent discharges and scabs of the ulcerative variety, through their irritating character, are a constant menace to the surrounding portions, taint the patient's breath, and prevent the application of medicines to the ulcerated spots.

The instruments for cleansing the nasal cavities have been described, but great circumspection must be used in choosing the proper one and the solution to be employed. It stands to reason that if we have an inflammatory process giving rise to hypertrophic changes, a comparatively powerful stream such as that of the douche will but stimulate the morbid process, while this stimulation will be the very *desideratum* in the opposite condition, that of atrophy. In the former, then, the atomizer is indicated, the spray possessing no perceptible mechanical force to irritate the surface to which it is applied. It merely softens the obnoxious substances, and these are subsequently blown out by the patient. For this purpose we require an atomizer which will throw a rather coarse spray, Sass' for instance, so that sufficient liquid to bathe the parts thoroughly be thrown into the cavities. When an atomizer cannot be obtained, the solution can be drawn up from a tumbler through the nose and allowed to run out of the mouth, or it can be snuffed up from the palm of the hand.

The selection of the solution to be used should also be guided by the nature of the affection. Where there is a profuse mucoid discharge, dependent simply upon the relaxation of the membrane, its mere mixture with an alkaline liquid will be sufficient to cause its dislodgment; but if this discharge is of a muco-purulent character, forming crusts in the sinuosities of the fossæ, a solvent will greatly facilitate the separation of these crusts from the walls by softening their edges and penetrating underneath.

Experiments have shown me that the following agents have relative solvent properties corresponding with their position in the list, the solutions cited representing the proper strengths for nasal irrigations:—

Aqua Calcis (pure). Slightly astringent and styptic, but not irritating.

Sodii Bicarbonas, gr. iv, to water ℥j. Emollient. Facilitates resolution of ulcerated surfaces.

Sodii Biboras, gr. iv, to water ℥j. Antiseptic and slightly stimulating.

Ammonii Chloridum, gr. v, to water ℥j. Slightly stimulating, especially to glands.

Sodii Chloridum, gr. iv, to water ℥j. Mild stimulant and alterative.

Potassii Bromidum, gr. xv, to water ℥j. Sedative and emollient. Induces slight anæsthesia of membrane.

As noted under each heading, the agents named possess secondary properties which should be taken advantage of according to indications. In uncomplicated chronic congestions of the nasal membrane, for instance, mild stimulation is of benefit; a solution of chloride of ammonium, while acting as cleansing agent, would consequently assist the direct medicinal treatment. Again, when hypertrophic changes have taken place, and stimulation is contra-indicated, a spray of bicarbonate of sodium would suit best, on account of its non-irritating character.

In cases in which the discharges are offensive, or when necrosis is present and disinfectants are required, these may either be used separately or in conjunction with the cleansing solutions. They all possess either stimulating or astringent properties, both of which are of advantage in the conditions giving rise to fetid discharges. When the fetor is not great, the biborate of sodium solution generally suffices, but if excessive, any of the following can be used with advantage:

Potassii Permanganas, gr. j–water ℥j.
Sodii Salicylas, gr. v–water ℥j.
Acidum Carbolicum, gr. j–water ℥j.
Phénol-Sodique, ♏xv–water ℥j.

MEDICATION.

The drugs used in the medicinal treatment of nasal affections may be classified according to their action on the mucous membrane, as Astringents, Stimulants, Alteratives, Sedatives, Protectives, and Escharotics.

ASTRINGENTS.

The action of astringents on the mucous membrane, when applied locally, is to induce contraction of the elements entering into its composition. It was formerly thought that they acted through their property of coagulating the albumen contained in its layers and in the blood-vessels, but the fact that their effect is only transitory, indicates that this cannot be the case. They form an albuminate with the albumen entering into the composition of the mucus covering the surface of the membrane, and if there is any excess, it penetrates through the surface, combining with and condensing the tissues beneath, and constringing the blood-vessels. Their power of coagulation is probably checked in the latter through the presence of the alkaline carbonates which are present in the blood. If the applications are repeated frequently and for some time, their constringing action on the vessels gradually diminishes the blood supply by lessening their calibre. The relaxation of the capillaries giving rise to over-secretion is antagonized, and dryness follows if the applications are continued beyond a certain limit. When chronic congestion has induced the formation of new elements, cellular tissue, vessels, etc, in the membrane proper, astringents cause their absorption through the interference with nutrition which their constringing effect on the vessels induces, and by the mechanical pressure their condensing action gives rise to; *but this absorption can only take place when the elements are of recent formation, that is to say, when they are not firmly organized.*

Their action on the membrane varies with the strength of the solution used. Very weak solutions are either inert or act as tonics on the previously-cleansed membrane; moderate solutions are astringent, and strong solutions are irritating, according to the drug used. The different effects obtained with the different degrees of strength are of the greatest importance, and the success of the treatment depends on their proper recognition.

In my opinion, the solutions generally recommended are too strong, and since I have somewhat reduced them for my own use I have obtained better results. Again, a pure astringent is hardly to be found, all possessing, in conjunction with their power of astringency, sedative, stimulating, or antiseptic properties. These properties should be taken in consideration when using them, choice being given to the astringent possessing secondary qualities beneficial in the case.

The following list embraces those astringent solutions which I have found most effective in nasal affections, with an outline of their secondary properties:—

Argenti Nitras, gr. v in water ℥j.—Slightly stimulating in weak (gr. iij–v) solutions, and sedative in strong (gr. lx–cxx) solutions on account of their powerful constringing action on the blood-vessels. Induces healthy changes in indolent ulceration. Indicated when there are ulcerations. Contra-indicated in hypertrophy.

Plumbi Acetas, gr. v–℥j.—Sedative by contracting blood-vessels powerfully. Indicated in acute and sub-acute catarrhal conditions.

Zinci Sulphas, gr. v–℥j.—Slightly stimulating. Hardens surface of membrane; checks excessive discharges of mucus. Indicated in relaxed conditions of membrane due to continued irritation by inhaling dust, smoke, etc.

Zinci Chloridum, gr iij–℥j.—Stimulating and antiseptic. Penetrates deeper into the membrane on account of its higher diffusion-power. Indicated in same conditions as the above when a stronger astringent effect is required, and when the discharges assume a purulent character.

Cupri Sulphas, gr. v–℥j.—Somewhat stimulating and disinfectant. Indicated in chronic catarrhal conditions, with mucopurulent discharges accompanied by fetor.

Alumen, gr. v–℥j.—Contracts blood-vessels, depressing vital action of ulcerations and checking mucoid and purulent discharges. Indicated in relaxed membrane with engorged capillaries. Styptic.

Acidum Tannicum, gr. viij–℥j.—Powerful astringent and styptic. Affects the whole substance of the membrane. Beneficial in all chronic conditions excepting atrophy.

The albuminate formed with the mucus generally assumes the form of a thin pellicle, which protects the membrane for a short time against the action of the air, and all substances floating in it, thus assisting in the healing process.

The above astringents can be administered by means of the atomizer, the cotton pledget, or in the shape of powder. The latter should be mixed with some neŭtral substance, such as pulverized sugar, starch, lycopodium, etc., the ounce of water being replaced by one drachm of the diluent used. Tannic acid, sulphate of zinc, and alum can, however, be used in very much stronger proportions, the former being sometimes applied pure.

Powders are dissolved slowly in the mucus, and their contact with the membrane is more prolonged and effective, but they should only be used when the discharges are copious, owing to their tendency to agglomerate and form obnoxious masses.

STIMULANTS.

When applied to a mucous membrane, stimulants suddenly increase its natural functions. This action, however, is but temporary, and the membrane soon resumes its normal state. If often repeated, this exaltation of normal powers becomes more prolonged each time, and a low state of inflammation is engendered in the membrane, by which all its elements are slowly multiplied. In the diseased condition, what parts have remained in a healthy state have their area gradually extended by the increased nutrition induced by the augmented blood supply, until its condition is sufficiently improved to enable it to resume its physiological functions.

Stimulants are consequently indicated in affections in which impaired nutrition is inducing degeneration or atrophy, but contra-indicated when that condition is accompanied by ulceration, on account of their irritating action. They are sometimes useful in acute inflammation, by inducing a flow of serum which relieves the distention.

Pure stimulants, as with astringents, are hardly to be found. All possess secondary properties which should be taken into consideration when used.

Acidum Carbolicum, gr. iij–℥j.—Disinfectant, astringent, and anæsthetic. Its fumes relieve distention by stimulating serous glands. Indicated in acute congestion and in atrophy.

Iodinium (pure), gr. ij to glycerine ℥j.—Alterative and disinfectant. Its fumes produce same effects as carbolic acid, but are more stimulating.

Argenti Nitras, gr. x to water ℥j.—Induces formation of new elements, and hastens resolution of indolent ulcerations. Indicated in atrophic conditions.

Ammonii Chloridum.—When nascent from the mingling fumes of strong aqua ammoniæ and muriatic acid.

Acidum Boracicum (pure or ʒj to glycerine ℥j). Slightly stimulating; promotes rapid healing of ulcerations.

Camphora (powdered) pure or as diluent.—Mild stimulant and disinfectant. Indicated in acute inflammation.

A drug deserving special mention and possessing, besides its extraordinary local anæsthetic powers, marked stimulating properties, is the

Hydrochlorate of Cocaine, gr. ij to water ʒj.—It does not possess any of the irritating properties of the other stimulants, if pure, and exerts its influence solely upon the vascular supply of the membrane by stimulating powerfully and suddenly the vaso-motors. It thus causes contraction of the vessels, reducing the blood supply to its *minimum*, arrests pain, and diminishes the engorgement causing distention. It is not only indicated in acute and chronic congestions of the mucous membrane, but also where hypertrophic changes have taken place. It reduces the volume of the growth to its lowest limit, and facilitates nasal respiration.

Stimulating steam inhalations are sometimes accompanied with the best results when used in chronic affections, especially where there is excess of secretion. Volatile oils are particularly well adapted for the purpose, but should be mixed with light carbonate of magnesia in the proportion of half a grain to each drop of the oil, to insure their being held in suspension in the water.

An inhaler, such as that in Fig. 28, can be used, or the hot water placed in a cup surmounted by a towel folded cone-shape, with the opening at the apex just large enough to insert the nose.

Creasotum, ♏x in Oss. water at 120°.—Disinfectant, astringent, and resolvent. Indicated when discharges are profuse.

Oleum Picis, ♏xx in Oss. water at 150°.—Disinfectant and resolvent. Indicated when there is ulceration.

Oleum Pini Sylvestris, ♏v in Oss. water at 140°.—Stimulates vessels principally, especially when these are relaxed. Alterative and antiseptic. Indicated when the discharges are profuse in acute and uncomplicated chronic conditions.

Oleum Cubebæ, ♏xx in Oss. water at 150°.—Properties the same as those of oil of pine, but less stimulating.

Oleum Eucalypti, ♏xx to Oss. water, at 130°.—Antiseptic and resolvent. Indicated where membrane relaxed and congested.

ALTERATIVES.

Local application of alteratives to the mucous membrane also produce their effect by influencing nutrition. They induce absorption of the morbid materials deposited in the substance of the membrane through an inflammatory process, if these are not too firmly organized. The glandular elements are somewhat stimulated and the secretions increased. They are consequently indicated in those cases in which hypertrophic changes are taking place, or where unhealthy discharges are kept up through deficient action of the glands. The two principal alteratives used in nasal affections, and by far the most efficient, are the preparations of iodine and those of mercury.

Liquor Iodinii Comp. (Lugol's Sol.), ♏iij–℥j.—Somewhat stimulating. Indicated in chronic affections.

Iodoformum, gr. x–lx. Pulv. Acacia, ʒj.—Sedative and antiseptic. Valuable when there is ulceration.

Hydrarg. Chlor. Mit., gr. ij–x. Sacch. Alb., ʒj.—Soothing. Indicated in acute or subacute inflammation, but contra-indicated when ulcerations are present.

Alteratives are best administered in combination with astringents. The latter hasten markedly the absorption of the morbid materials through the mechanical compression which they induce.

SEDATIVES.

The facility with which medicines are absorbed by the nasal mucous membrane renders sedative applications very effective. They soothe the membrane by limiting its functional activity, and by direct action on the sensory nerves. They are principally used to allay the pain incident upon severe local applications. They sometimes arrest an acute inflammation when used early. In the frontal headaches which accompany many nasal affections, sedatives are effective, not only by allaying the nervous irritability of the parts, but by influencing the inflammatory process.

After painful applications, or operations, the following are most effective:

Erythroxylon Coca (concentrated infusion).—Applied with atomizer or cotton pledget immediately after operative procedures, arrests pain and limits subsequent inflammatory symptoms.

Morphia, gr. ⅛–¼.—Either of its salts can be used, in solution or in powder, mixed with bismuth or lycopodium.

Belladonna (extract), gr. ij to lard ℥j.—Soothing in acute inflammations. Restricts nutrition of morbid growths.

Sedatives applied by steam inhalations are probably more efficient than by any other form of application. The vapor of hot water is in itself very soothing, and enhances greatly the action of the medicines employed with it.

Benzoin (compound tincture), ʒj in Oss. water at 130°.

Conium (juice of), ʒj in Oss. water at 130°.

Chloroformum, ♏xx in Oss. water at 130°.

Hyoscyamus (fluid extract) ʒss in Oss. water at 130°.

Acidum Hydrocyanicum (dilute), ♏iij in Oss. water at 115°.

In some cases of chronic catarrh, applications of astringents and stimulants, although seemingly indicated, give rise to violent irritation, thus doing more harm than good by increasing the morbid process. Sedative applications in these cases are generally followed by the best results, especially when used with either of the agents described in the next paragraph, which, combining with the solution, forms a thin coating over the hypersensitive membrane, and protects it against the air.

PROTECTIVES.

This class of agents have for their object the prevention of the irritation occasioned by the passage of air through inflamed or ulcerated cavities. They form, with the secretions present, a coating which covers the mucous membrane effectively and for a certain length of time, and protects it not only against the mechanical action of the atmospheric current, but also against any extraneous substances it might contain.

Bismuthi Subnitras, *lycopodium*, *pulverized talc*, and *starch* are the most effective protectives. They are generally used in combination with the other agents indicated in the case, acting as diluents.

ESCHAROTICS.

Escharotics are frequently employed in the nasal cavities to destroy exuberant growths, or to limit by the cicatricial contraction which follows their use, what power of dilatation such growths may possess. They combine with the tissues and destroy them; inflammation around the destroyed area follows, and the latter is separated as a slough, while all the layers of the membrane are consolidated by the hyperplastic products of the inflammatory process. Mild escharotics are sometimes used to annul hyperæsthesia of the superficial nerves. They destroy less tissue, and their action is limited to the surface, unless applied repeatedly. The over-sensitive nervous filaments of the cauterized portion are either destroyed by the disorganizing action of the agent, or covered by the subsequent cicatricial formations.

Nitric Acid, applied with small absorbent-cotton pledget. Diffusive power very great. Violent inflammation follows too extensive applications. Used in large hypertrophies.

Chromic Acid, applied with metallic probe, previously heated and dipped in the acid. Penetrates less deeply and gives rise to less pain. Indicated in same condition, but requires a greater number of applications.

Glacial Acetic Acid, applied with absorbent-cotton pledget. Has great affinity for epithelial cells. Power of penetration limited. Indicated in hypertrophies of recent formation and in hyperæsthetic conditions of the membrane.

The addition of hydrochlorate of cocaine to nitric acid, in sufficient quantity to form a saturated solution, not only renders its application absolutely painless, but seems to bring the inflammatory process to an early ending without interfering with the therapeutic action.

The agents above described represent those I have found the most effective in the medicinal treatment of affections of the nasal passages. The list could be much lengthened were I to include all those tried and found of inferior value. An outline of the differential properties of each drug having the power of inducing organic change is added, because I consider their proper recognition of the greatest importance, and that upon their intelligent adaptation to each case depends the success of the treatment. The thoroughness with which applications are made to the parts is not less important. Each affected spot should not only be carefully treated after thorough cleansing, but the applications should be repeated often enough to keep up a continuous effect. I doubt whether any application other than one inducing destructive metamorphosis produces an effect lasting more than four hours. It should consequently be renewed at the end of that time, and repeated as nearly as possible at regular intervals. As the patient must necessarily be intrusted with a part of the treatment, he should be carefully taught the manipulation of the atomizer, douche, or insufflator prescribed, and be seen as often as circumstances will permit. The different agents are sometimes exhibited in gelatine bougies, medicated cotton, etc. These, as well as the compound remedies, such as iodo-tannin, iodide of zinc, etc., the special remedies, and the formulæ found most effective, will be described under the headings of the diseases in which they are used. This will also be the case with internal medication, which, although not always indicated in the treatment of nasal affections, is sometimes of the greatest importance.

CHAPTER VI.

DISEASES OF THE ANTERIOR NASAL CAVITIES.

ACUTE RHINITIS.

(Synonyms:—Acute Coryza; Acute Nasal Catarrh; Acute Rhinorrhœa; Acute Nasal Blennorrhœa; Cold in the Head; Snuffles.)

Etiology.—Acute inflammation of the nasal mucous membrane is caused, in the majority of cases, by exposure to cold when the body is overheated. The inspiration of hot, dry air is another frequent cause, while, less frequently, irritating vapors, dust, and the emanations of certain drugs, act as exciting agents. Predisposition is an important factor in many cases, some persons being affected by the least exposure to any of the exciting mediums. Children are particularly subject to it, while the aged enjoy comparative immunity. A scrofulous taint seems to render the mucous membrane susceptible to frequent attacks, and in persons of a rheumatic diathesis, it is very often present. In women of a nervous temperament, it is occasionally an accompaniment of menstruation. The affection forms a prominent symptom of a number of diseases, such as measles, scarlatina, hay fever, etc. It occasionally appears as an epidemic, through atmospheric perturbations. As to its contagiousness, repeated experiments have given uniformly negative results. On the other hand, the nasal mucous membrane of some individuals is exceedingly sensitive to the action of external infectious discharges, and acute rhinitis can be occasioned in them by using the handkerchief of a strumous subject, repeatedly kissing a person affected with scrofulous rhinitis, etc. The coryza of nurslings is often the result of local infection by the vaginal secretions of the mother during birth.

Pathology.—When the attack is brought on by exposure to cold, the temperature of the surface exposed is suddenly brought below the normal standard. In those persons in whom the nasal membrane is the area of least resistance, the impression made on the peripheral nerves is transmitted through the sympathetic to the vaso-motors of the nasal membrane, and the result is a sudden contraction of its vessels, soon followed by dilatation. The flow of the blood through them is first hastened, then slackened, and the latter soon begins to accumulate, continuing to do so more and more as the current becomes slower. After some time the engorgement becomes so great that the serum transudes through the vessel-walls, accompanied by leucocytes, fills the neighboring parts, causing distention, and penetrates through the epithelial layer to the surface of the membrane, dragging along with it some of the leucocytes or pus corpuscles, and sometimes red corpuscles and epithelium. The distention would be limited, however, were the layer of venous sinuses, or erectile caverns termed the "turbinate corpora cavernosa," and situated between the membrane proper and the periosteum, not present. These sinuses, most abundant over the turbinated bones, especially at their posterior portion, take an active part in the inflammatory process by becoming filled with venous blood. As the disease progresses, the secretion, at first thin and watery through the action of the over-stimulated serous glands, which pour out their normal secretion in excessive quantities, becomes more and more charged with broken-down epithelial cells, lymph corpuscles, pus globules, etc., until it assumes the character of thick, tenacious mucus, or muco-pus, according to the cell elements held in suspension.

When the affection is caused by direct irritation to the membrane through the agency of smoke, dust, irritating gases, etc., the glandular elements are probably the first affected, and, becoming engorged, act as foci of the pathological process. An overheated atmosphere induces the latter by causing a too rapid evaporation of lubricating fluids.

Symptoms.—The onset of an attack of acute rhinitis may vary in severity from a mere fit of sneezing, followed by hardly perceptible concomitant symptoms, to a severe systemic disturbance, manifested by fever, notable rise of temperature, rigors, etc. In the majority of cases, however, the attack begins with a sensation of dryness and fullness in one or both nostrils, corresponding with the stage of hyper-vascularity. A dull frontal headache soon begins, due to inflammation by continuity of tissue of the lining membrane of the frontal sinus, accompanied by creeping, chilly sensations in the back, and occasionally dull, ephemeral pains in the muscles and joints. Intense itching in the nasal cavities causes frequent sneezing, and prompts the continual and ineffectual use of the handkerchief.

With the stage of dilatation, begins a free, watery discharge, strongly alkaline in reaction, and irritating to the surfaces with which it comes in contact, viz., the alæ of the nose and the upper lip. The decreased lumen of the cavities causes the voice to acquire the peculiar quality known as "nasal twang," which becomes more marked as the occlusion increases. The eyes are usually suffused with tears, through partial or entire closure of the tear ducts. Hearing may be temporarily impaired, through involvement of the Eustachian tubes. The skin is hot and the pulse rapid, although the temperature may not be influenced. As the affection progresses, the discharge becomes thicker and thicker until it assumes a muco-purulent character, at times positively fetid and nauseating. About this time, the affection either gradually disappears, or extends to the pharynx and larynx, inducing slight catarrhal symptoms, which generally last but a few days.

Anterior rhinoscopy reveals a highly congested membrane, swollen at times to a degree sufficient to completely occlude the cavity. Pressure with a probe causes a depression which disappears as soon as the instrument is taken off. The olfactory tract is generally but slightly affected, although the sense of smell may be completely obtunded by the tumefaction in the respiratory tract, which prevents the access of odoriferous particles to the roof of the nose. The posterior nares are also redder than usual, especially at the posterior ends of the turbinated bones.

Prognosis.—The duration of an attack of acute rhinitis, varies from one day to several weeks. It sometimes ceases with the end of the first stage, while at others, complications cause it to be prolonged for weeks. Its termination, as far as life is concerned, is, with very rare exceptions, always favorable. A few cases of death have been reported in nurslings and very old people, caused by interference with nasal respiration in the former, and bronchial complications in the latter. As to sequelæ, the estimate usually given that 90 per cent. of the population of the United States are more or less affected with some form of chronic rhinitis, would indicate that acute rhinitis, when not an exacerbation of the chronic condition, is, in the great majority of cases, the primary expression of a future state of chronicity.

Treatment.—Success in the treatment of acute rhinitis depends entirely upon the length of time between the onset of the affection and the beginning of the treatment. The longer that time, the smaller the chances of success, until the disease has become firmly established, when palliatives can alone be given, and the culmination perhaps hastened. If seen early, an attack of acute rhinitis can generally be cut short. If severe, the patient should be placed in a warm room and a derivative treatment instituted. I have found that medicines inducing abundant diaphoresis are most effective for the purpose, combined with small, stimulating doses of tincture of opium. The following treatment has produced the most satisfactory results:—The patient is given a hot mustard foot-bath and put to bed, and the following mixture is administered:

℞ Ammonii Chlor.	℈ij.	Increases the action of the heart and the rapidity of the circulation, and tends to maintain the fluidity of the blood in the stage of dilatation.
Tinct. Opii.	♏xxiv.	Relieves the irritability of the nervous filaments and favors the action of the above. Maintains the continuity of the blood-current, thus preventing its transudation through the vessel-walls, and hindering the migration of white corpuscles.
Sacch. Alb.	ʒj.	
Aq. Camphoræ	ad℥j.	

M. Sig. One teaspoonful in a half glassful of water every hour three times, then every two hours.

The nose should be greased externally with lard or cold cream to limit the evaporation over its surface, while pulv. talc., snuffed or insufflated into the nostrils, protects them against the irritation caused by the respiratory current. When the headache is severe, fifteen grains of bromide of potassium added to each dose, are very effective, by inducing contraction of the arterioles of the membrane lining the accessory cavities and lessening its distention. When the fever is great, the chloride of ammonium might be replaced by tincture of aconite root, one minim to the dose, but not combined with it, on account of the antagonistic action of the two drugs on the circulation. The local effect is produced by the opium, assisted by the diaphoretic and diuretic properties of the aconite, which at the same time reduces the fever. The patient should not leave the house until at least six hours after taking the last dose of medicine, the action of the drugs having then ceased. He should be warmly clad.

The derivative action of a purgative sometimes aborts a severe attack of rhinitis, the salines being the most effective by causing liquid stools. A large dose of quinine, gr. x–xv, repeated in six hours, has also given good results. If the patient is first seen when the affection has run into the stage of dilatation with free discharge, the hydrochlorate of pilocarpine in doses of gr. $\frac{1}{8}$, in water, repeated every two hours until free diaphoresis has been obtained, is sometimes very effective. It first increases the fullness in the nostrils and the flow of secretion, these being soon relieved by profuse perspiration. When the latter has decreased somewhat the patient is briskly rubbed with a rough towel, under the blankets, until the skin becomes quite red. He is then allowed to sleep and will generally awaken much relieved, and at times cured.

Ordinary cases of acute rhinitis can generally be aborted if seen in the first stage, and often in the second, by the following powder:

℞. Morph. Hydrochlor., gr. ij.	Counteracts the local paretic influence upon vasomotors, and stimulates the local and general circulation; relieves the frontal headache by reducing the nervous irritability.
Aluminis	Antagonizes the vascular dilatation of the first stage and prevents or arrests serous transudation.
Bismuthi Carb. Pulv. Talc āā ℈j.	Protectives.

M. et ft. chart. No. xx.

S. Insufflate one powder in each nostril every two hours, after clearing the nose.

Stimulating inhalations are sometimes very effective, by inducing a copious flow of serum, which relieves the tension of the membrane, causing contraction of the blood-vessels. The fumes generated by mixing pure iodine and carbolic acid are especially beneficial. A couple of drops are placed on a small piece of absorbent cotton, previously introduced into the bulb of the insufflator shown in Fig. 25, and the opening is closed with a stopper. The patient uses the instrument himself, his breath mixing with and warming the fumes, which are thus better prepared to meet the irritated membrane. This method is especially useful when the Eustachian tubes and accessory cavities are involved in the inflammatory process. By closing the other nostril with the finger, the nasal cavities are tightly closed when the act of blowing is performed through the mouth, and the velum palati adapts itself closely against the pharynx. Finding no other issue, the medicated atmosphere must of necessity penetrate into the accessory cavities and Eustachian tubes, especially the latter. The essential oils of tar, eucalyptus, and cubebs can be used with advantage in the same manner.

I have of late been using, with much success, a four per cent. solution of the hydrochlorate of cocaine. This agent, by stimulating powerfully the vaso-motors of the membrane, antagonizes the vaso-motor paresis, thus counteracting the vascular engorgement and the transudation. It is serviceable in all the stages of the affection. It is best applied with the cotton-carrier, a thin film of absorbent cotton being employed. The membrane, previously dried as effectively as possible with another cotton-carrier, is freely covered with the solution. At the end of a couple of minutes, the distended membrane having suddenly depleted itself and collapsed, the "stuffiness" completely disappears, and does not return until about three-quarters of an hour later. A renewal of the application is followed by the same result, while, after a third application, the distention and consequent stenosis do not generally recur. Five or six consecutive applications are sometimes necessary.

Galvano-caustic applications, by suddenly stimulating the vaso-motors, are also very effective, the flat side of the knife at cherry heat, being applied two or three times to the most prominent portions of the distended membrane.

SIMPLE CHRONIC RHINITIS.

(Synonyms :—Chronic Coryza; Chronic Blennorrhœa; Chronic Rhinorrhœa; Chronic Nasal Catarrh; Purulent Catarrh; Fluxus Nasalis.)

Etiology.—Chronic inflammation of the nasal mucous membrane is generally the result of repeated acute attacks. At times, however, it seems to occur without any apparent primary condition, assuming from the first the symptoms of chronicity. It is a frequent sequel to the rhinitis of the newborn, while in persons of debilitated constitution and in the aged, it often presents itself in the form of a watery flux, non-irritating in character, but sometimes very profuse. Certain occupations favor its development by exposing the mucous membrane to the irritating action of an atmosphere loaded with dust, smoke, etc. Weavers, for instance, are seldom free from it, while the majority of carpenters and cigar-makers are affected more or less. It is frequently seen in smokers, not as a result of the habit proper, but on account of the irritating character the surrounding atmosphere acquires when contaminated with smoke. Certain substances, among which may be mentioned arsenic, bichromate of potash, the fumes generated by the action of muriatic acid on lead solder, and the emanations of caustic acids, when inhaled for a certain length of time, as is the case with workmen manufacturing or using them, frequently produce chronic rhinitis, followed at times by perforation of the nasal septum.

Pathology.—Frequent inflammatory manifestations in the nasal mucous membrane, whether due to the action of cold or to that of a local irritant, gradually reduce to permanency the abnormal condition of the vascular supply accompanying an acute attack. The repeated distentions to which the vessels have been subjected, cause them to lose their contractile power, and they remain distended. Their walls become softened and more permeable, and blood-elements escape continually by a process of filtration. These blood-elements, however, now contain more white corpuscles, many of which crowd into the connective tissue under the epithelial layer, thus inducing induration and thickening, while others, having become metamorphosed into pus cells and unripe epithelial cells, penetrate through the epithelium, and with the glandular secretion, form the muco-purulent discharge frequently accompanying the affection. The turbinate corpora cavernosa take part in the inflammatory process but slightly, although their power of erection is more susceptible to manifest itself upon the least exposure.

Symptoms.—When the affection is the result of frequent colds, the membrane becomes turgescent upon the least exposure, and all the local symptoms of the acute condition appear. Each exacerbation distending the membrane more and more, resolution becomes slower with each attack, until a state of permanent "cold in the head" is engendered, accompanied by more or less discharge of thick, tenacious, translucent mucus, which sometimes assumes a purulent character, and is generally drawn through the posterior nares into the mouth, and expectorated or swallowed. Sneezing is a frequent symptom, most evident during the exacerbations, and in a large proportion of cases, the tip and alæ of the nose are pinkish and sometimes quite red. These symptoms are in abeyance during warm weather, to resume all their vigor with the first damp days of Fall.

In the variety sometimes termed "traumatic rhinitis," in which the trouble is due to constant local irritation, the most marked symptom is increased secretion, in the form of a thick, creamy substance, also generally voided through the posterior nares. When the condition has lasted for some time, the discharges become purulent, and occasionally form small greenish masses, which can be seen adhering here and there, connecting like bridges the two sides of the cavity, and occasionally imparting to the breath a peculiar heavy odor. A hot, dry, spicy sensation is frequently complained of, located not only in the nose, but also in the pharyngeal vault and pharynx, these appearing, upon examination, congested and parched. Itching caused by the accumulation of irritating particles in the anterior portions of the nostrils, prompts the frequent introduction of the fingers, and the septum sometimes becomes perforated through repeated scratching, and as a result of the long-continued contact with the bulk of the irritating fumes or particles as they enter the cavity. Pain over the brow is often present, coupled with a feeling of weight, due to inflammatory narrowing of the infundibulum, the canal connecting the frontal sinus with the nasal cavities. The Eustachian tubes are occasionally involved, through extension of the inflammation into them. The symptoms continue, regardless of seasons (provided, of course, that the causes of irritation are continued), differing in this from the chronic rhinitis due to repeated colds.

In a small proportion of cases, and especially in persons of advanced age, the complaint consists of a profuse watery secretion, so abundant at times as to cause great annoyance. A sensation of itching is felt as the fluid trickles along the intra-nasal walls, which adds much to the patient's distress. The other symptoms of chronic rhinitis are usually absent.

The appearances of the parts, anteriorly and posteriorly, differ with the causes of the affection. In the variety resulting from repeated colds, the membrane covering the middle and inferior turbinated bones and the septum, may not appear redder than in the normal state. This is especially the case with children, notwithstanding the great amount of discharge which accompanies the affection in them. In adults the membrane is usually congested, sometimes almost livid, and if seen during an exacerbation, bulges out, often sufficiently to touch the septum. The bulging portion pits under pressure and resumes its previous state sluggishly when the pressure is removed. In the traumatic variety, the membrane is always found highly congested, and bleeds when touched with a probe. It is not so prone to turgescence, the inflammatory process being confined principally to the superficial layers and involving but slightly the corpora cavernosa. When the condition is due to exposure to cold, on the contrary, the external influence is transmitted through the sympathetic to the vaso-motors of all the layers, and the corpora cavernosa take part in the inflammatory process as much as the other layers. In the chronic rhinitis characterized by a watery flux, the membrane is usually pale, sometimes blanched. The pharyngeal vault takes part more or less in the three varieties of the affection, and its color corresponds with that of the anterior nasal cavities.

Prognosis.—If left to itself, chronic rhinitis either remains stationary, or gives rise to hypertrophic changes in the layers of the membrane. It is generally the starting point of polypi, and is frequently the origin of catarrhal occlusion of the Eustachian tubes. When properly treated, the chances of recovery are very favorable, provided the irritating cause be removed. Recurrence, however, is very frequent when the affection occurs as the result of repeated attacks of acute rhinitis brought on by cold. This is especially the case with the aged, and in debilitated constitutions.

Treatment.—The success of the treatment depends greatly upon a proper recognition of the cause of the trouble in each individual case. Cleanliness is of prime importance, especially when the affection is due to local irritation by extraneous matters, but great circumspection should be used in selecting the proper instrument. A too powerful stream would act as a local irritant, and while performing its office as a cleansing agent, would increase the inflammatory process and encourage hypertrophic changes. The atomizer is undoubtedly the best instrument for the purpose, providing its spray be coarse enough to bathe the membrane thoroughly, and wash away accumulated discharges. As to the solution to be employed, preference should be given to one combining with its cleansing properties, that of reducing local congestion. The following combination has proven itself very effective in the fulfillment of these conditions:—

℞. Sodii Bicarb. Sodii Bibor.	āā gr. viij.	Alkalinize the solution and give it proper specific gravity. Antiseptic and solvent.
Ext. fld. Pinus Canad.	♏xv.	Astringent and antiseptic. Contracts the capillaries and the glands, diminishing secretion and encouraging the absorption of inflammatory products.
Glycerinæ	ʒij.	
Aquam	ad ℥iv.	

In the variety originating from repeated colds, the above should be applied with the atomizer sufficiently often to keep the membrane free of accumulated discharges. This requires generally two or three applications daily, each of three or four minutes' duration. A few days of thorough cleansing generally limit the active congestion markedly, and the membrane is prepared to undergo active treatment. In mild cases, the mere continuation of the spray is sometimes sufficient, through the astringency of the extract of pine, to cause the membrane to regain its normal state, but such is not the case when the condition has progressed for a certain length of time; more active measures must be adopted to counteract the inflammatory process; the new products must be absorbed and the tone of the vessels returned to its normal standard. Of many preparations and combinations tried for the purpose, the glycerite of carbolized iodo-tannin, prepared as follows, has produced for me the most satisfactory results :—

℞. Iodinii	ʒss.	Stimulates the absorbents, inducing absorption of inflammatory products.
Acidi Tannici	℥ss.	Causes contraction of blood-vessels, superficial and deep, giving them tone and hardening their walls, thus limiting infiltration and nutrition. Stimulates absorption of new elements by mechanical constriction.
Aquæ	Oss.	
Mix, filter, and evaporate to ℥ij, and add		
Glycerinæ	℥iv.	
Acidi Carbol. liq.	♏ij.	In weak solution reduces superficial hyperæsthesia, rendering membrane less sensitive to atmospheric perturbations and irritating particles. Antiseptic and slightly astringent.

This preparation forms a clear solution, which remains in contact with the membrane for a considerable period on account of its oily consistence. In order to obtain the best effects, it should be applied several times daily, each time after thorough cleansing. The patient must consequently be taught to conduct the applications himself, and to use a feather, the most efficient and the safest instrument for the purpose. This being dipped in the solution, is introduced into the nasal cavity and so manipulated as to bathe the mucous lining thoroughly. In most cases the end of the feather can be pushed back into the posterior nasal cavity, and these parts can thus take part in the treatment. The applications should be made on rising, twice during the day, and on retiring, thus maintaining a steady action, an essential factor in the treatment. Business men, who cannot return home during the day, can keep a small vial of the solution at their place of business, the feather being so connected with the stopper as to dip in the preparation when the latter is not in use. They are thus able to continue the applications at regular intervals during the day, after clearing the nose as well as possible with the handkerchief. The patient should be seen twice or three times a week, and thorough applications made to the anterior and posterior nares, using for the former the small cotton-carrier (Fig. 20), and for the latter a cotton pledget, held in the grasp of the post-nasal forceps (Fig. 22). At times, the good effect may be enhanced by alternating with other remedies, such as the iodide of zinc (gr. v–℥j), and the sulpho-carbolate of zinc (gr. ij–℥j), both of which produce their therapeutic action by inducing absorption of the inflammatory products and stimulating the blood-vessels. A two per cent. solution of hydrochlorate of cocaine, applied night and morning, produced excellent results in the two cases in which it was used.

Powders are sometimes preferable in the treatment of these cases, especially when the discharge is very profuse. The following will be found effective:—

℞. Hydrarg. Chlor. Mit.	Action the same as the iodine in the preceding formula.
Pulv. Aluminis āā ʒss.	Substituted for the tannin on account of its greater power over serous glands. Its effect on blood-vessels the same.
Morphiæ Hydrochlor. gr. ij.	Reduces hyperæsthesia.

Bismuthi Subnit. ʒj. { Protective.
Sodii Bibor. ʒss. { Disinfectant.
M. et fiat pulv. j.

After cleansing the nose thoroughly, if possible, with the atomizer, if not, with the handkerchief, a pinch of the powder can either be snuffed or introduced into the nostrils with the auto-insufflator (Fig. 27). The latter method is of course much more effective, the powder being more evenly distributed. Blowing the nose should be avoided for at least ten minutes after the application. Repeated four or five times daily, this procedure soon limits the excessive discharge, and after some time frequently restores the membrane to its normal state.

When during an exacerbation the degree of stenosis is great, indicating extensive distention of the membrane, the application of an escharotic over a limited area is indicated. One application of nitric acid generally suffices for each nostril. The small cotton-carrier shown in Fig. 20 is the most desirable instrument for the purpose, the diminutive thickness of the blade enabling the operator to wrap a thin film of cotton-wool around its tip, and still form a very small volume. The nostril being well dilated and illuminated, the end of the cotton-carrier is dipped into the acid and pressed against a piece of blotting-paper, so as to part with any excess of acid and prevent dripping. It is then introduced into the nose and drawn rapidly along the whole length of the most prominent portion of the inferior or middle turbinated bone, or both, as the case may be, taking care not to touch the septum. A sharp pain follows if the acid is applied pure, which will be avoided if hydrochlorate of cocaine has previously been dissolved in it to saturation. A long narrow eschar is the result, which upon healing forms a cicatrix which prevents future distention, this being assisted by the consolidation induced in the deeper layers of the membrane by the acute inflammatory process following the cauterization. Galvano-cautery, which will be described under the next heading, can be used with advantage instead of the acid, the edge of the knife, at cherry heat, being introduced into the most prominent portions of the membrane.

In all applications of this character, there is danger of inflammatory adhesion with the septum, when the parts are in close apposition. To guard against this, the patient should be seen in a couple of days, and if any tendency to adhesion should show itself, *i.e.*, bands of soft tissue connecting the burnt area with the opposite surface, they should be torn by passing a probe through them, and a cotton wad, anointed with cosmoline, interposed.

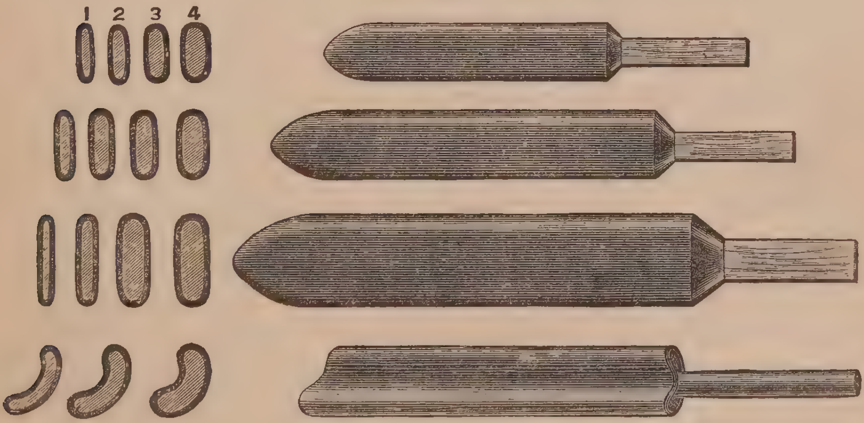
In the treatment of this form of nasal affection, more than in any other, easily digested food, cleanliness and avoidance of exposure to sudden changes of temperature are fully as important as the local treatment, and should receive careful attention.

In the majority of the cases of so-called "nasal catarrh" we are called upon to treat, the nasal obstruction is due to a permanent turgescence of the membrane, in which all the phenomena accompanying one of the exacerbations above described are present. This condition is frequently mistaken for hypertrophic rhinitis, and treated as such. It can be recognized, however, by noting the sluggish recoil of the turgescent membrane when pressure upon it with a probe is suddenly discontinued, and the completeness of its collapse under the influence of a four per cent. solution of hydrochlorate of cocaine.

Systematic pressure by means of bougies is sometimes very effective in this form of the affection. Those generally used are either metallic, or made of medicated gelatine. The former give rise tó much pain, and for that reason are not recommendable. As to the latter, their soft consistence and their small diameter enable them to be introduced into the nasal passages without difficulty. Gentle pressure is exerted, and the medicament is kept in contact with the membrane until the bougie has become completely liquefied. They are introduced with a rotatory motion, and left in position until complete liquefaction has taken place, which generally requires about twenty minutes. The head should be tilted backward while the bougie is in place, so as to enable the liquefied gelatine to escape through the posterior nares. This procedure should be repeated twice daily. I have obtained more satisfactory results, however, by using flat bougies instead of round ones, and by having them so made that a much longer contact with the membrane is necessary to cause their liquefaction. The first modification increases their mechanical efficiency, by enabling them to be passed between the septum and the edges of the middle and inferior turbinated bones, the usual sites of greatest turgescence, thus locating the pressure where it is most required. Round bougies are held with difficulty in this position, and in the majority of cases slip into the meati. Their rapid liquefaction causes them to as rapidly reduce their diameter, and the pressure is reduced in proportion. By means of the second modification, the decrease in size is very slow and gradual; the pressure is therefore more continuous and even, and the contact of the medicament with the infiltrated membrane more prolonged.

The applications are best begun with the smallest caliber, one of these being introduced twice daily. The first day, it should remain *in situ* but a couple of minutes each time, to accustom the membrane to its pressure. Pain is seldom complained of, the discomfort consisting principally of an intense itching sensation and lachrymation, which disappear after a few sittings. Two minutes being added each day, at the end of the first week, each application lasts about a quarter of an hour. No. 2 should then be introduced, beginning and gradually increasing as with No. 1, two minutes the first day, four the second, etc. With the third week, No. 3 is brought into requisition and used in the same manner, while No. 4 can be employed the fourth week, if necessary. When the cavity has become sufficiently dilated, the use of the last bougie employed should be continued for some time, gradually diminishing the number of applications until one is made during the day, then every other day, etc. When the mucous membrane is very sensitive, the first few applications can be preceded with advantage by a local application of a two per cent. solution of hydrochlorate of cocaine.

Fig. 29.



Flat and crescentic nasal bougies.

In a large proportion of the cases, the turgescence projects downward from the free border of either the middle or the inferior turbinated bodies, or both, occluding more or less the meati. When this condition is present, I use the crescentic bougies shown in Fig. 29, introducing them myself once every day, so that the pendant portion rests in the concavity, and direct the patient to use the flat bougies every morning. The latter he can apply with the greatest ease, the shape of the instrument forcing it to enter where it is needed. As to the former, however, they are less easily applied in their proper position, and should only be introduced by the physician.

The bougies, whether round, flat, or crescentic, containing either of the following ingredients, have been found most serviceable in this affection: Hydrastis Canadensis, gr. v; Erythroxylon Coca, gr. x; Ext. Belladonnæ, gr. ½; Boro-Glyceride, gr. v; Ergotin, gr. v. A complete list, with indications, will be found in the Appendix.

The drawback attending this method of treatment, however, is that the relief is but temporary. If no measure be taken to maintain the membrane in the position to which the bougies have returned it, in a year, at most, the membrane will have relapsed into its former condition. This can be avoided, however, and the cure rendered complete, by applying an escharotic to the membrane, in two or three places, limiting each application to an area not larger than a millet seed, and located as far apart as possible on the surface of each turbinated bone affected. This will be followed by cicatricial bands, which will bind the membrane down, as it were, and cause it to maintain its proper thickness. Galvano-cautery is the most satisfactory agent for the purpose, but when this is not at hand, nitric acid can be used in the manner indicated.

When the affection is due to local irritation, it stands to reason that a permanent cure can only be expected on the condition that the exposure to the irritating substances be discontinued. In most cases, however, a change of occupation is an impossibility, and the only course to be pursued is to mitigate the deleterious effects by keeping the nasal cavities as clean as possible, and by protecting the membrane against the offending substances during exposure. The method of cleansing and the formulæ described above, are especially valuable in this class of cases. The patient should be carefully taught the manipulation of the instrument and directed to use it after his day's work, on retiring and rising. At work he should wear, in each nostril, a piece of loose cotton-wool, which will act as a sieve, and retain the greater part of the foreign matter floating in the atmosphere. The same medicinal treatment as that described for the preceding variety of chronic rhinitis is indicated, the pathological processes of both being identical. When the local inflammation is caused by the fumes of acids, etc., the officinal belladonna ointment, used several times daily, seems to be the most effective application, the protection afforded by the excipient against their irritating action doubtless coming in for a large share of the good effect. In this way, cosmoline is also useful. The cotton wad should also be worn by these cases, and by dipping it occasionally in a saturated solution of bicarbonate of sodium, the acid fumes will be partially neutralized when inhaled, thus losing much of their irritating property.

In the variety of chronic rhinitis characterized by profuse watery secretion, cleansing is obviously unnecessary. The watery flux being due to complete relaxation of the membrane, astringents are indicated to induce contraction of the elements entering into its composition. Their action is but temporary however, unless coupled with a systemic treatment calculated to counteract the paretic state of the local blood-vessels. The condition is at best exceedingly difficult to treat successfully. Powdered alum gr. j in talc gr. ij, applied with the auto-insufflator four times daily, has served the best for the local treatment, with sulphate of strychnia gr. $\frac{1}{60}$, gradually increased to gr. $\frac{1}{20}$, internally administered three times daily, after meals. A weak faradic current passed through the nose by placing one of the poles on each side of its external surface below the bridge, carefully wetting the sponges to insure penetration, is sometimes followed with gratifying results, especially if combined with the medicinal treatment described.

In some cases, the local irritation is so great that sedative applications can alone be borne. Much relief can be afforded by using as cleansing agent, the bromide of potash solution (gr. xv–℥j) with the atomizer, three or four times daily. Slight anæsthesia is induced, and the membrane is not influenced by the passage of the air-current and what foreign particles it might contain. An exceedingly effective application in these cases, is a two per cent. solution of hydrochlorate of cocaine, applied every three hours with a camel's hair pencil. It not only modifies the superficial irritability, but limits markedly the general congestion by causing contraction of the blood-vessels and sinuses. One drachm of the solution will last three or four days if used carefully. When it cannot be procured, the fluid extract or the concentrated infusion of coca can be used instead, applying it pure. The powder recommended for acute rhinitis (p. 69) will also be found very satisfactory, its *modus operandi* being the same as in that affection. When the membrane is dry, however, the sedative steam inhalations, described on page 61, are preferable.

PLATE II.

PLATE II.

Figure 1.—Posterior view of left nasal cavity in the normal state.

" 2.—Lateral " " " " "

" 3.—Anterior " " " " "

" 4.—Rhinoscopic " " " " "

" 5.—Rhinoscopic " " " " " mirror slightly turned.

" 6.—Microscopical section of the nasal mucous membrane over the turbinated bones.

a, Superior turbinated bone.
b, Middle " "
c, Inferior " "
d, Eustachian orifice.
e, Soft palate.
f, Uvula.
g, Posterior nasal cavity.
i, Vestibule.
j, Sphenoidal sinus.
k. Frontal "
l, Epithelium.
m Submucous layer.
n Corpora cavernosa.
o, Fossa of Rosenmuller.

Figures 7 to 12.—Acute rhinitis, or appearances during an exacerbation of simple chronic rhinitis.*

Figure 11.—Rhinoscopic view of hypertrophied adenoid tissue in the posterior wall of the naso-pharynx during an acute exacerbation.

Figures 13 to 18.—Hypertrophic rhinitis; anterior, middle and posterior hypertrophies; fimbriated adenoid vegetations in the naso-pharynx.

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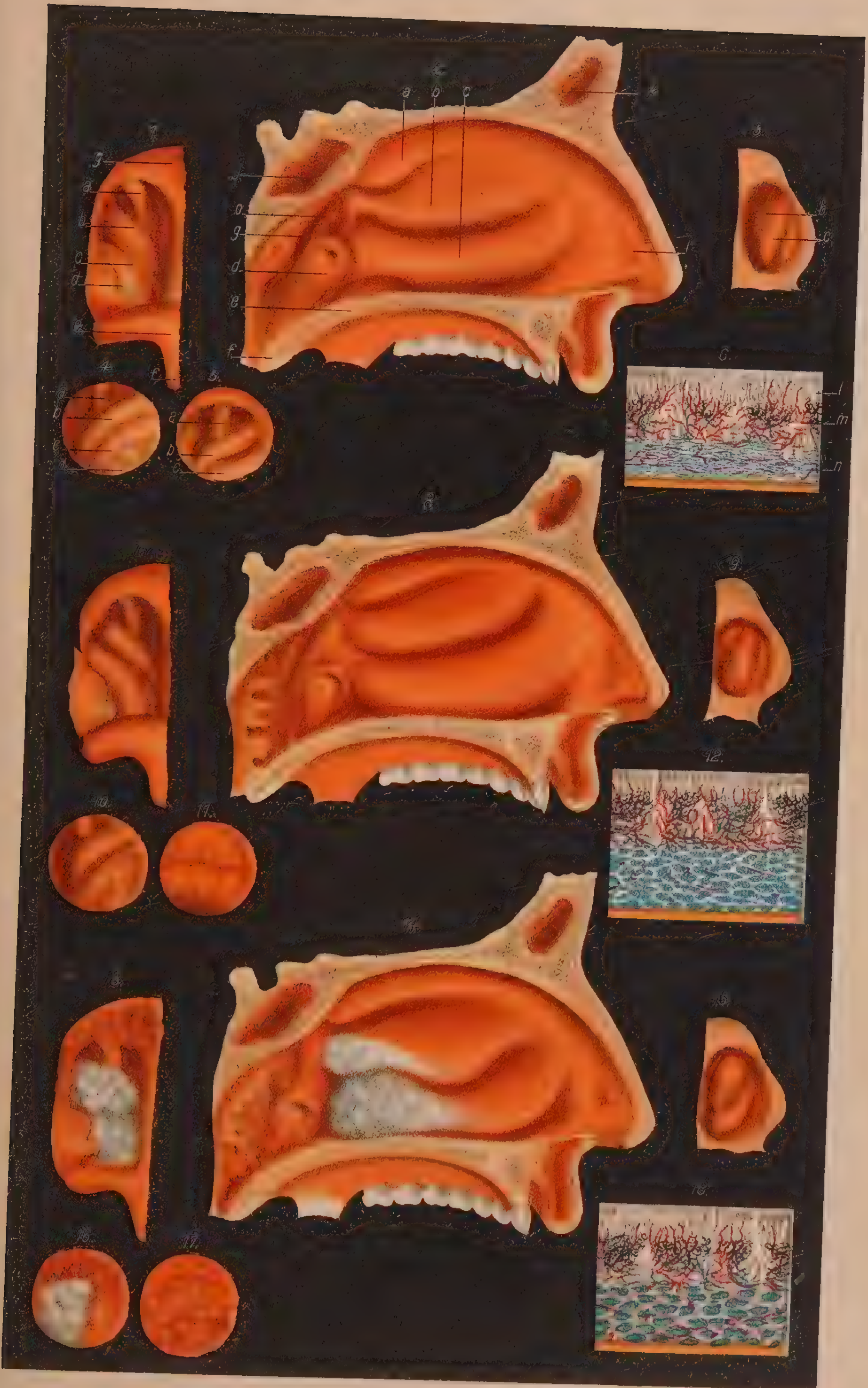
* Represented as seen under gas-light. Under natural light, the red color is much lighter.

Plate II



E. Sajous, Pinxit

Burk & M^c Fetridge, Lith. Phila.

HYPERTROPHIC RHINITIS.

(Synonyms:—Hypertrophy of the Turbinated Bones; Hypertrophic Nasal Catarrh; Hypertrophic Ozœna.)

Etiology.—Hypertrophy of the nasal mucous membrane occurs, in the majority of cases, as a result of frequent attacks of acute rhinitis, or as a complication of chronic rhinitis. The causes of these affections are consequently the initial factors in the production of the hypertrophic changes, to which may be added improper treatment, such as the frequent use of irritating snuffs, solutions of nitrate of silver, or the too forcible application of the douche. In some cases, it seems to occur idiopathically.

Pathology.—While in uncomplicated chronic rhinitis there is already a certain amount of thickening and induration in the epithelial layer, it only becomes hypertrophic rhinitis when this thickening involves, besides the epithelial layer, the other elements of the membrane. When the chronic condition has existed for some time, the infiltration, stimulated now and then by an inflammatory exacerbation, finally becomes organized, and connective tissue is formed, not only in the mucous membrane proper, but in the sub-mucous layer, the "corpora cavernosa." The walls of the venous sinuses become abnormally thickened and rigid through this increase of new connective tissue, and cannot collapse as they do when their walls are normal, but remain distended, thus contributing largely to the general increase in thickness. As the formation of connective tissue progresses, new blood-vessels are formed, and all the normal elements of the membrane are increased in proportion. Its thickness can thus be multiplied several times, but as the new formations are not evenly distributed, the surface is irregular in outline, *i.e.*, less hypertrophied in some localities than in others. The free borders of the middle and inferior turbinated bones are the most frequent sites of these hypertrophies, but the septum is also occasionally involved. The venous sinuses of the posterior portions of the turbinated bones being much larger than in other localities, hypertrophies are frequently found there, sometimes sufficiently large to cause complete stenosis of the posterior nares. These are termed *posterior hypertrophies*, in contradistinction to those situated in the anterior portion of the nasal cavity, which are called *anterior hypertrophies.*

Hypertrophic changes usually progress slowly, many years sometimes elapsing before a simple chronic rhinitis will have merged into the hypertrophic variety.

Symptoms.—The most prominent symptom of hypertrophic rhinitis is the interference with nasal respiration. As the mucous membrane increases in thickness, it becomes much more sensitive to the action of cold and other irritants, and the least exposure to their effects causes it to become suddenly engorged, the swelling induced thereby being added to that already existing as a result of the hypertrophic changes. When in that state the membrane is sometimes sufficiently distended to occlude the nasal cavity completely, while at times, the hypertrophy proper is so great that the cavities are permanently occluded. Any position favoring the gravitation of the blood to the hypertrophied parts is sufficient in the majority of cases to cause their distention; lying on the right side, for instance, will cause occlusion of the right nostril, tilting the head forward will cause occlusion of both, etc., while suddenly assuming the erect position, or any startling noise or stroke, will cause immediate collapse of the membrane by suddenly stimulating the sympathetic system and inducing sudden contraction of the vessels. When the occlusion is great and constant, the patient soon acquires the habit of breathing through the mouth. The physiological functions of the nose not being performed, the air reaches the other portions of the respiratory tract without having been purified of its irritating elements, dust, etc., and without having been supplied with moisture and heat. Follicular pharyngitis and catarrhal laryngitis are, for that reason, frequent accompaniments of the affection, while in persons predisposed to pulmonary affections, it may become the starting-point of phthisis. The voice acquires a peculiar muffled character, complicated with the so-called "nasal twang," due to the partial or complete absence of nasal resonance, as the case may be. The face sometimes assumes an air of stupidity, owing to the constantly opened mouth. The eyes are sometimes reddened and watery, on account of the occlusion of the lachrymal canal. Hearing may be gravely compromised, through mechanical impediment of posterior growths, the accumulation of discharges in the mouth of the Eustachian tubes, or inflammatory infiltration of their mucous lining. The distended membrane preventing the access of odoriferous bodies to the olfactory region, the sense of smell may be completely absent, while that of taste may be sensibly diminished on account of its intimate relation with the former. Periodical headaches in the frontal and supraorbital regions are often complained of.

There is usually considerable increase in the amount of nasal secretion. Quantities of thick viscid mucus accumulate in the posterior nasal cavity, and adhering there, force the patient to hawk and scrape until the discharges are drawn into the mouth and expectorated. These do not originate only in the anterior cavities, but also in the pharyngeal vault, the glands of which are over-stimulated. When the hypertrophy is great, the impediment to their free egress causes them to accumulate in the sinuosities of the passages, to form there, through the evaporation of their watery constituents, fetid masses or scabs, generally of a greenish-brown color. The breath is consequently very offensive at times, this being especially the case in persons of a strumous diathesis. The frequent contact of these irritating discharges with the pharynx on their passage downward, adds another cause for pharyngeal inflammation to the preceding, while the constant hawking keeps up an active congestion of the soft palate, which soon induces elongation of both it and the uvula, adding to the original affection new causes for active symptoms. The larynx is also exposed to the action of what discharges are not expectorated, by acting as a receptacle for them, owing to its proximity to the pharyngeal wall. The secretions run down along the latter and meeting the posterior laryngeal border, either pass into the cavity of the larynx between the arytenoids or are swallowed. In order to clear the throat of the embarrassing agent, hemming is resorted to, which, added to the hawking and scraping already described, make the sufferer an unpleasant companion. The catarrhal laryngitis excited by oral breathing is thus aggravated, cough supervenes, and this, in conjunction with what muco-purulent discharges are expectorated, frequently leads the patient to believe that he is phthisical. The diminished lumen of the larynx, when highly congested, may give rise to asthmatic symptoms, and these, combined with the difficulty experienced in breathing through the nose, cause the patient great annoyance, especially at night and upon exertion. Reflex asthma is also occasionally present as a result of the intra-nasal pressure.

Upon examining the parts anteriorly, the membrane will appear normal in color in some cases, and red in others, according to the intensity of the inflammatory process. The lumen of the cavity examined being decreased in proportion to the degree of hypertrophy, it may be but slightly encroached upon by the thickened membrane, or to a degree sufficient to cause complete stenosis. The surface of the inferior turbinated bone is usually the most prominent portion, and bulges out sufficiently, sometimes, to compress the septum, frequently giving rise to ulcerations and slight epistaxis; ordinarily it only approximates the latter, and its edge rests against the floor of the cavity. It yields upon pressure with a probe, to suddenly recover its former shape, differing in this from simple chronic rhinitis, where the resumption of shape is sluggish. In the former case, the newly-organized tissue forms an elastic bed which immediately recoils, while in the latter, the pressure merely displaces a certain amount of infiltration which is slower in returning to its former position. The middle turbinated, when much hypertrophied, stands out more horizontally, and as its longitudinal axis slants from before backwards more than the inferior, the under surface of its free edge is usually seen resting against the septum, and appearing to form part of it.

The septum often takes part in the hypertrophic process, its mucous membrane presenting the same appearances in color as that over the turbinated bones. Whether located on the septum or over the latter, the thickening is not evenly distributed, occurring in some cases in irregular prominences, and in others as thick, cushion-like protuberances, involving the whole length of the affected portion. The turgescence differs from that of simple chronic rhinitis by its permanency, occurring in the latter affection only during exacerbations. The turbinated bones proper are sometimes hypertrophied, their conformation being easily determined by means of a probe.

Hypertrophies involving the posterior ends of the turbinated bones and the posterior portion of the septum, can only be seen with the aid of the rhinoscopic mirror. They present appearances altogether different from those just described, not only in shape but in color. There are two varieties, the *white* and the *purple.* The white hypertrophies, by far the more common of the two, are usually rounded, and present an irregular surface much like that of a raspberry. They protrude more or less into the posterior cavity, frequently compromising mechanically the openings of the Eustachian tubes, which are immediately behind, on each side. The inferior turbinated bone is most frequently their seat, but they are also often present at the posterior portion of the middle turbinated, and on each side of the septum near its posterior border, bulging out in the direction of the turbinate hypertrophies, and assisting in the production of stenosis. The second variety, purple in color and much softer to the touch, are rarely met with, and occur principally on the inferior turbinated body. They bleed easily, sometimes upon the least contact of an instrument.

The vault of the pharynx is often implicated in the affection, being merely congested in some cases, while in other cases it is the seat of pathological changes so important as to merit special consideration in another portion of this volume.

Prognosis.—Occurring in a subject in whom no faulty diathesis exists, hypertrophic rhinitis, so far as the local condition is concerned, does not tend to assume a dangerous character. When it has reached a certain limit, amounting to complete nasal occlusion in some, and to hardly perceptible interference with nasal respiration in others, it either remains in that state until the patient has passed middle life, when the hypertrophied membrane, influenced to a greater degree than the system at large by the general atrophic process, gradually recedes to its normal state, or merges into atrophic rhinitis, which will be described under the next heading. When the degree of hypertrophy has been great, a certain amount of nasal obstruction sometimes remains, the bones proper having taken part in the hypertrophic process and remained hypertrophied. Hearing is frequently compromised, and sometimes lost. The sense of smell is generally impaired, resulting occasionally in complete anosmia, and involving, in the majority of cases, the sense of taste. Pharyngitis sicca, occurring as a result of the oral breathing, and the contact of the pharynx with the discharges, is a frequent sequel. The affection is the origin of a vast majority of the many cases of catarrhal laryngitis we are called upon to treat during the winter months, and it is but reasonable to conclude that in an individual predisposed to pulmonary consumption, it may act as an exciting cause. Emphysema is frequently observed when the nasal obstruction is of long standing.

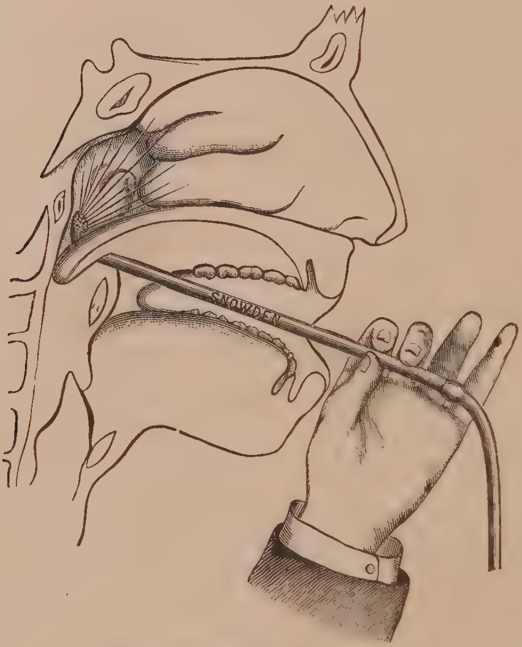
Since the introduction of surgical measures in the treatment of hypertrophic rhinitis, its prognosis as to recovery has become very favorable. When medicinal treatment was solely relied upon, the benefit it procured was but temporary, the organized state of the new cellular tissue elements rendering their absorption hardly to be expected.

Treatment.—Clinical experience has demonstrated that when the new connective tissue elements characterizing the affection are yet undergoing formation, their absorption can be induced by medicinal treatment or by pressure, but that when these tissues have become firmly organized, surgical interference can alone produce permanent results. A clear differential diagnosis between these two conditions is consequently of the greatest importance before instituting treatment.

Whether hypertrophic rhinitis occur as a result of simple chronic rhinitis, or from any other cause, its early pathology and initial symptoms are so allied with those of the latter affection as to render any differentiation between them exceedingly difficult, if not impossible. As the hypertrophic process advances, however, the two affections gradually assume distinct positions, not only in pathology, but in their subjective and objective symptoms. The differential diagnosis consequently resolves itself into determining whether the pathological condition is as yet in that state in which it cannot be distinguished from the simple chronic condition, in which case the treatment described for that affection would be indicated, or whether the pathological changes have so far progressed as to make the diagnosis hypertrophic rhinitis, rendering surgical procedures necessary. As already explained, the resiliency of the redundant portions, when pressed upon, furnishes means by which the presence of hypertrophic tissue can be estimated, while the degree of hypertrophy can be ascertained by inducing contraction of the turgescent areas, by a local application of a four per cent. solution of hydrochlorate of cocaine. The membrane, completely emptied of its fluids, cannot contract more than the organized elements in its layers will allow, and its actual thickness can then easily be determined. In uncomplicated chronic rhinitis the contraction is almost complete, the thickening in the sub-epithelial layer not being sufficient to cause any appreciable difference in the appearance of the membrane. Its surface is smooth and uniform, the conformation of the bone beneath being often descernible. As soon as sufficient hypertrophic tissue has formed to become noticeable, however, the smoothness and uniformity are lost, and irregular prominences appear, indicating the localities in which the hypertrophic process is most advanced, and where surgical measures will be most effective.

The presence of hypertrophic rhinitis having been recognized, a successful result can only be obtained by resorting to a treatment calculated to destroy a sufficient quantity of the redundant tissue, to insure, with the assistance of the resulting inflammation and the subsequent cicatricial contraction, its complete reduction. Cleanliness, however, as in the other forms of rhinitis, is an essential part of the treatment, but great care should be practiced in conducting the cleansing measures, lest too much mechanical irritation or stimulation encourage the morbid process. When the degree of hypertrophy is moderate, and the discharges are soft, satisfactory ablution of the parts can be conducted through the anterior nares. The atomizer serves the best for the purpose, all other methods, even inhaling liquids from the palm of the hand, involving undesirable mechanical irritation. When the hypertrophic process has so far progressed as to cause marked narrowing of the cavity, the spray will not reach the mucous surface behind the bulging portions, and the solution must be applied posteriorly. In these cases, however, the discharges are generally considerable, and they agglomerate into thick masses, which adhere with so much tenacity that the cavities cannot be thoroughly cleansed unless more mechanical power accompany the stream than is the case when the atomizer is used. A very satisfactory instrument for the purpose is Hall's bulb syringe (Fig. 16). Its stream can be so nicely regulated that any degree of force can be employed, while any quantity of fluid can be injected at a given time. This becomes of great importance when the limited space remaining free in the anterior nasal cavity for the egress of the liquid is remembered. The glass nozzle, shown in Fig. 16, cannot be used, however, the volume of liquid it allows to pass being too considerable. That represented in the cut below, a hard rubber tube with end turned upward and perforated with minute holes, allows the solution to flow in numerous little streamlets, which bathe the parts thoroughly without causing a too rapid accumulation of fluid. The directions given for post-nasal douching should be carefully followed by the patient.

Fig. 30.



The nozzle for posterior irrigation in position.

The cleansing solution recommended in simple chronic rhinitis can also be used in this affection. It is very pleasant to the patient, effective in removing accumulated discharges, and does not irritate the parts, when used lukewarm (100° F.). It is best prescribed prepared in tablets, one of these containing twenty grains of each of the three ingredients, and forming the exact proportion for one pint of water. The solution formed possesses, besides cleansing and medicinal properties, the proper specific gravity. When the breath is very offensive, three grains of permanganate of potassium may be added. A complete list of these tablets will be found in the Appendix.

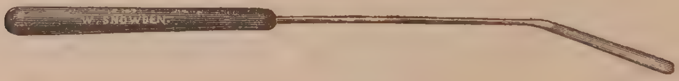
The means at our disposal for the reduction of the hypertrophied mucous membrane differ according to the degree of hypertrophy, and consist in the use of caustic acids, galvano-cautery, the galvano-caustic snare, and the cold-wire snare.

The three acids usually employed are the nitric, chromic and glacial acetic. The first is by far the most powerful, and its action can only be limited by using it in very small quantities at a time. If too much is applied to the membrane, deep-seated ulceration may ensue, and give rise to much annoyance.

As already explained, a very thin probe should be used, with a film of cotton wrapped around the tip. Being dipped in the acid, and applied against a blotter to prevent dripping, the cotton pledget is applied to the most prominent portion of the membrane, limiting the application to an area about the size of a small pea. A sharp pain is felt, unless the membrane be previously anæsthetized with cocaine, or the acid contain a sufficient quantity of the latter in solution. When the cocaine is not used, however, the pain can be quickly arrested by applying with the atomizer a saturated solution of bicarbonate of sodium, which will also limit the penetration of the acid. During the day, the patient experiences a sensation of fullness in the nostril cauterized. This, however, only lasts a few hours, and in some cases does not occur at all. The next day, shreds of the destroyed mucous membrane are discharged, and a feeling of relief is at once experienced. This continues until all the cauterized tissue has been thrown off, leaving a groove to mark the seat of the exfoliation. This groove gradually fills up, not by reproduction of tissue, but by a displacement, as it were, of the surrounding superficial stratum, which contracts, thereby constricting the parts beneath. This process requires for its completion about a week. A great advantage possessed by nitric acid is that it requires but one or two applications to contract markedly the hypertrophied membrane. At least two weeks should elapse between each application. An earlier renewal of the cauterization on the same spot might give rise to serious inflammation, and perhaps erysipelas.

In inexperienced hands, glacial acetic acid is a much safer agent, but requires a greater number of applications to produce the same effect. The instrument shown below, devised by Dr. Bosworth, of New York, is very convenient for its application. Its end is flattened, and when wrapped with cotton, presents a comparatively wide surface, while at the same time it can be introduced into the narrowest cavity. It is dipped into the acid if both sides of the cavity are to be treated, that is, if there is septal hypertrophy besides the turbinate, and dropped on one side if the hypertropy be limited to the latter. The vestibule being dilated and illuminated, the charged end is passed into the nasal cavity along the free edge of the hypertrophied turbinated body, or applied to the septal growth, as the

Fig. 31.



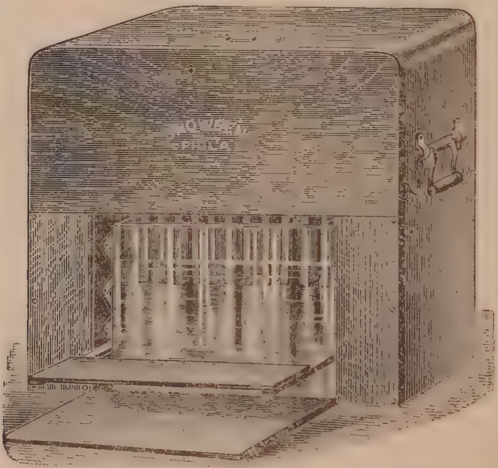
Bosworth's probe.

case may be. The pain induced is much less severe than when nitric acid is used, but again the amount of tissue destroyed is much more limited. Seven or eight applications at a week's interval are necessary to produce the effect of one application of nitric acid, but the improvement is gradual and steady, and if care be taken to touch the same spot each time, in order to as much as possible avoid the destruction of the ciliated epithelium, not only will the stenosis be remedied, but the physiological functions of the membrane proper will be preserved.

Chromic acid is highly recommended by several eminent specialists. The most convenient method for its employment is to heat the tip of an ordinary probe and to apply it against one of the acicular crystals of the acid. Care should be taken not to overheat the instrument, lest decomposition of the acid occur. Enough adheres for two applications. Chromic acid gives rise to little or no pain, and is very effective, but systemic intoxication is liable to occur if too great a quantity is used at one sitting. Its application should consequently be limited to a small area, and renewed from two to five times as the case may be. As with nitric and glacial acetic acid, any excess can be neutralized by applying over the cauterized surface, a saturated solution of bicarbonate of sodium.

Galvano-cautery possesses many advantages over any method employed for the reduction of hypertrophics. Its application gives rise to but little pain, and the local inflammation following its use is so limited, that it is hardly perceived by the patient in the great majority of cases. A number of excellent batteries are at our disposal, among which may be mentioned Seiler's, of Philadelphia, and Piffard's, of New York. The former is the more convenient of the two instruments, and was used by me until lately, when, having replaced cold wire snaring by galvano-caustic snaring in my practice, I found it necessary to devise an apparatus capable of furnishing a greater quantity of electricity when this was required, without increasing the bulk of the instrument. Fig. 32 represents the battery as the plates are being immersed, the foot of the operator having depressed the pedal and caused the plates to descend into the glass jar containing the fluid. The degree of heat can thus be easily regulated at will by raising or lowering the foot, an advantage introduced by Seiler's battery. The foot-motion, however, is much more limited than in the latter, and does not necessitate raising the heel from the ground. The body being thus well supported, the steadiness of the hand is not compromised. An important feature in its construction is that the mechanism for lowering and raising the plates is wooden, and is, therefore, not influenced by the acid fumes. The plates being corrugated, as suggested by my friend, Mr. Arthur Kitson, electrical engineer, more

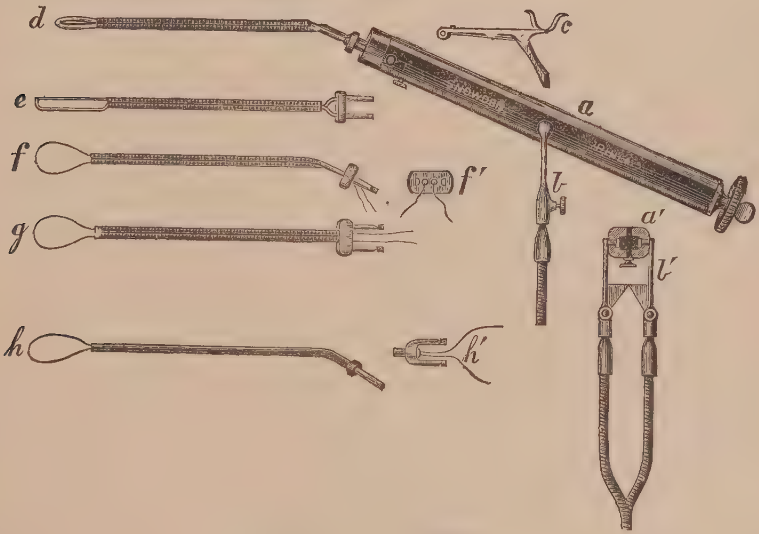
Fig. 32.



Author's galvano-cautery battery.

surface is exposed to the fluid, and a slight to-and-fro motion, which can be communicated to the plates from the outside of the case, causes them to agitate the fluid to such a degree as to liberate the hydrogen bubbles deposited on their surface. Polarization can thus be prevented to a marked degree. Notwithstanding its small size (being only fifteen inches wide, fourteen high, and nine deep), this battery can heat from the smallest platinum point to a thick loop of the same metal.

Fig. 33.



Author's universal handle.

a, handle; *a′*, central section of handle; *b*, side view of clasp; *b′*, full view of clasp; *c*, finger-lever; *d*, electrode for flat applications; *e*, electrode for linear incisions; *f*, cautery snare for horizontal growths; *f′*, the latter, seen from behind; *g*, cautery snare for perpendicular growths; *h*, cold-wire snare; *h′*, the latter, seen from above.

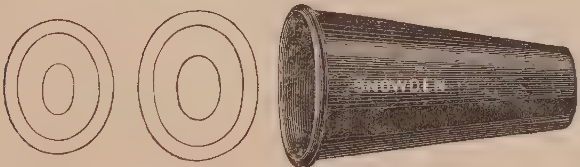
Some years ago Dr. Shurly, of Detroit, devised an ingenious handle with a set of electrodes, for galvano-caustic applications to the nose and pharynx. For my own use, I had constructed the handle shown in Fig. 33, preserving the convenient shape of Dr. Shurly's instrument and the relative angle of the electrodes. The mechanism, however, is different, and enables it to be used not only for holding electrodes, but for either cold or galvano-caustic snaring, and for a number of purposes which will be described under the headings of the diseases in which it is applicable.

The handle *a*, *a'*, is made of hard rubber and hollow throughout. A metallic rod or conductor is fastened to each side of its interior, extending from the middle of the handle to within one-quarter inch of its extremity, each end serving to secure one of the posts of the canula used, when the latter is inserted as shown in the cut. These posts being notched, are maintained in position by a corresponding tooth at the end of each conductor, the latter possessing enough spring to insure perfect hold. By pressing on a button situated on each side of the handle, near its extremity, the ends of the conductors are approximated, thus disengaging the teeth from the notches, and allowing the canula to be withdrawn. When the instrument is to be used for snaring purposes, the posts of the canula employed are adjusted and held in the same manner. The wire having been passed through the cylinders of the electrode, or through the tube of the cold-wire snare, its two ends are attached to the end of a movable vulcanized strip, which protrudes somewhat, and can slide up and down in the interior of the handle. Traction can then be induced by turning the milled nut at the posterior extremity of the instrument, which revolves around a threaded screw fastened to the rear end of the hard-rubber strip, or by pressing upon the finger-lever *c*, the arm of which pushes the strip backward by working in a ratchet screwed to its upper surface.

For cold snaring, what is known as No. 5 piano wire is the most satisfactory, possessing the required tensile strength and elasticity. For galvano-caustic snaring, platinum wire must be employed, of a thickness proportionate with the degree of resistance to be met with.

The handle is connected with the battery cord by means of a clasp, *b* and *b′*, the two arms of which are furnished at their extremity with right-angle posts. These rest against the conductors by passing through holes penetrating the sides of the handle on each side. Although grasping the latter firmly, through the action of a strong spring-hinge which unites the arms of the clasp, one of the posts is not in perfect contact with the conductor on the same side (this being prevented by a short spring between the arm and the handle), but the contact becomes perfect by slight pressure of the thumb when the instrument is held, and the circuit can thus be closed or opened at will, leaving the index finger free, to work the finger-lever *c* if required. When the circuit is closed the current passes through the clasp to the conductors, which in turn transmit it to the canula. To disengage the clasp from the handle, the lower ends of the arms of the former are approximated, thus causing the upper sections to open out.

Fig. 34.



Allen's nasal specula.

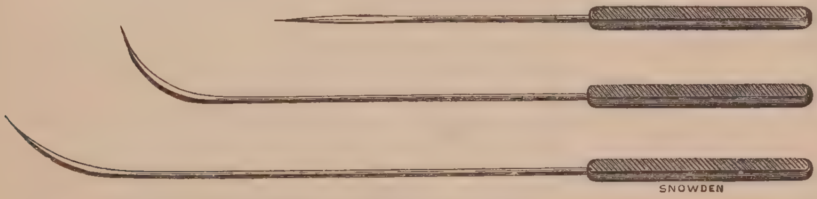
When the hypertrophy is situated anteriorly and is not very large, a linear incision, made with knife *c*, is sometimes sufficient to reduce it completely. In order to obtain the best effect from the cauterization, the platinum loop must be introduced glowing, and the margin of the nostril must therefore be protected. Dr. Harrison Allen's nasal speculum is very efficient for the purpose, and, several sizes being procurable, a suitable instrument can be employed in each case. It should be inserted and held with the left hand in such a manner that the prominence to be treated will appear opposite the small opening. The knife is then entered into the speculum, and the circuit is closed just as the platinum loop has reached beyond its external or wide opening. Holding it there an instant, until the proper heat is attained, the instrument is pushed forward so as to cause its sharp edge to penetrate the centre of the prominence, and advanced until an incision of the desired length has been made. The circuit is then broken, and the instrument is withdrawn cold. As a result, the different layers of the membrane are severed, including the dilated blood-vessels and sinuses, and cicatricial bands are formed which cause the contraction to involve its entire thickness.

An important matter in connection with this operation is the proper regulation of the heat. When the platinum point is not sufficiently hot—*black heat*—it causes great pain. When it is too hot—*white heat*—it causes profuse hemorrhage. *Cherry heat* is hardly felt by the patient, causes no bleeding, and is more effective than either of the two others.

Some specialists employ a shield to protect the membrane of the septum; I have never found such an instrument necessary, and merely apply a little vaseline over its surface, to avoid the sensation of heat which the radiation from the hot metal might occasion. Should the septal membrane be accidentally touched, the burn heals without trouble. Such is not the case, however, if the skin around the margin of the nostril is singed; the pain is not only very severe, but lasting.

The after-effects of an application of galvano-cautery, performed in this manner, are almost *nil*. Occasionally, slight inflammation occurs, the membrane swells, and slight shooting pains are felt along the distribution of the fifth pair, especially the superior maxillary branches. After a few hours, however, these symptoms disappear and the membrane returns to its former state. Some cases have been reported in which violent inflammation occurred after galvano-caustic applications. I have never met with such a misfortune, the only untoward effect noticed being a momentary polypoid swelling of the membrane of the middle turbinated bone, occurring, strange to say, in the same locality in three patients. The slight inflammation induced by galvano-caustic or acid applications, may cause adhesion of the cauterized area to the membrane of the septum, and thus obstruct the cavity. This should be guarded against by seeing the patient every other day while the inflammatory process is progressing, pledgets of cotton being interposed between the surfaces to prevent their agglutination, if necessary. If a second application should be deemed advisable, a week, at least, should elapse before making it, in order to allow the local inflammation to subside.

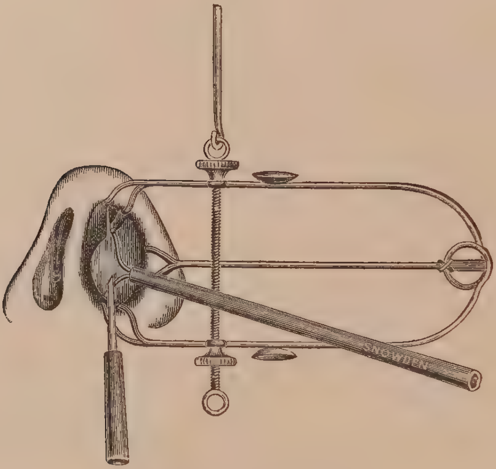
Fig. 35.



Jarvis' transfixing needles.

When the hypertrophies are very large, the contraction resulting from simple applications is not sufficiently effective. A portion of the membrane must be removed. For this purpose, Dr. Jarvis' transfixing needles are very useful. One of these being passed through the growth as shown in Fig. 36, the cautery loop *f* (Fig. 33) is passed into the nasal cavity over the handle of the needle, and over its point as it protrudes from the surface. The wire being then tightened around the growth, by depressing the finger-lever, the circuit is closed, and a few turns of the milled nut at the end of the handle will cause separation of the transfixed portion of the hypertrophied membrane from its base. The pain experienced is usually very slight, and the wound heals without trouble.

Fig. 36.

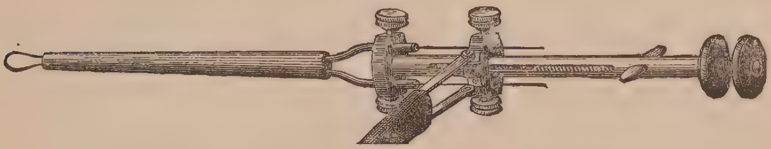


The needle and loop in position.

This operation may also be performed in the manner suggested by Dr. Harrison Allen, which consists in applying the heated loop against the side of the growth, and allowing it to burn its way into it, until a portion of the mass can be grasped, when the loop may be narrowed and the portion removed. Dr. Allen employs for this and his other galvano-caustic snaring operations, the ingenious instrument shown in Fig. 37.

The body of the instrument consists of a slotted aluminum barrel containing a screw of equal length. The latter is connected with a vulcanite "carriage" which moves freely over the barrel, and serves for the attachment of the wires and battery cords. A milled nut at the end of the screw causes the latter to descend when turned, and the loop is thus drawn home. A novel feature introduced by this instrument is the fact that the platinum wire is covered with a uniform coat of copper, excepting alone the portion forming the loop, which is bare. The current can in this manner be transmitted along the wires by means of the copper layer.

Fig. 37.

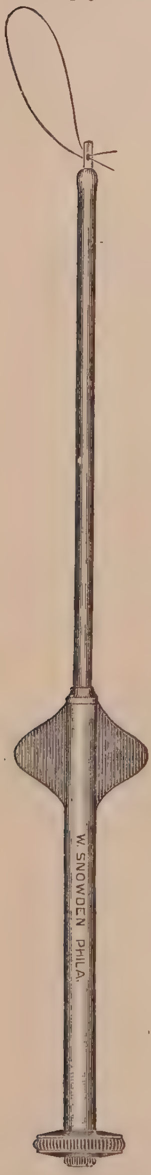


Allen's galvano-cautery snare.

When the surgeon is not possessed of galvano-cautery instruments, the same operation can be performed with the cold-wire snare shown in Fig. 38, a modification of an instrument also invented by Dr. Jarvis.

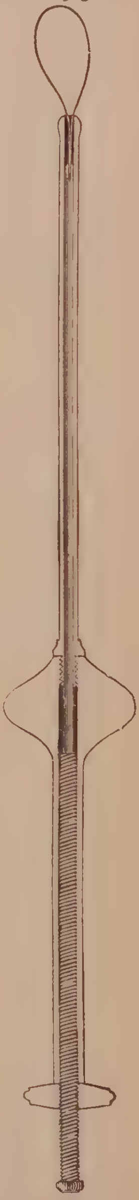
To arm it for use, a small piece of wire two or three inches in length, according to the size of the tumor, is doubled into a loop, and the ends are passed through the eye of the rod until they protrude a quarter of an inch. Traction being then caused by turning the milled nut, the end of the rod, which otherwise projects beyond the extremity of the tube a short distance, disappears in the latter, doubling the wire ends on the loop. The latter is then firmly held and ready for use. Being passed over needle transfixing the membrane, the nut is turned until the tumor is firmly held in the grasp of the loop. Care must now be taken to not cause it to cut through too hastily, lest severe hemorrhage occur. Twenty to thirty minutes, at least, should be employed to gradually penetrate the growth, turning the nut once in a while. If performed in this way the operation is hardly painful; but little blood is lost, and the wound heals readily.

Fig. 38.



Author's modification of Jarvis' snare.

Fig. 38.



Longitudinal section.

The diagnosis of posterior hypertrophies is not difficult when a good view of the posterior nares can be obtained with the rhinoscope. The peculiar ashy color of the white growth, its rugous surface and its situation are so characteristic, that a mistake can hardly be made. Polypi, however, often resemble them, but their smooth surface and the history of the case are generally sufficient to indicate their nature. The red growths are by no means as common as the white. Their violet hue is also characteristic, while their soft consistence and their tendency to bleed when touched, serve to differentiate them from fibrous polypi or osteomata, with which they might be confounded. When examination of the parts cannot be conducted satisfactorily with the mirror, much information can be obtained by introducing the index finger behind the soft palate, and gently advancing it until its palmar surface comes in contact with the posterior border of the septum. The posterior nares can then be easily made out, and the conformation and density of the parts ascertained.

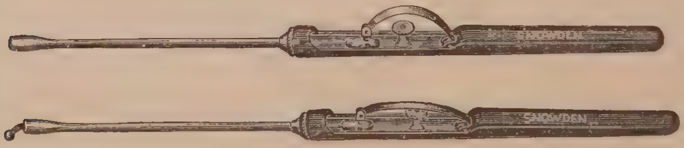
Repeated observation has demonstrated, conclusively in my opinion, that local medicinal treatment does not influence posterior hypertrophies, and that in all cases, some active measure must be resorted to which will affect the growth mechanically. The means at our disposal are the same as for anterior hypertrophies:—acids, galvano-cautery, and the galvano-caustic, or cold-wire snare.

Before selecting any of these, however, it is of great importance to determine whether the growth is principally apparent through extensive distention of the venous sinuses —*soft hypertrophies*—as is the case in the majority of the white and in all the red hypertrophies, or whether the fibrous tissue, which predominates in posterior growths, forms the greater portion of its bulk—*hard hypertrophies*— the venous sinuses, in that case, being much smaller and fewer in number. A four per cent. solution of hydrochlorate of cocaine can be used for the purpose, as for anterior hypertrophies. When distended sinuses are the principal cause of the turgescence, immediate contraction will follow and the tumor will almost disappear, whereas if true hypertrophy of all the layers be present, the influence of the drug will hardly be noticeable. In the first condition, acids or galvano-cautery are indicated, because the snare, by cutting through the enlarged and engorged sinuses, would expose the patient to serious hemorrhage, while in the second, the snare can alone be effective, the acids and galvano-cautery being comparatively powerless to remove the mass of exuberant tissue, which, when cut, bleeds but slightly, if at all.

The position of the growth rendering a view through the anterior nares impossible, the direction and proper location of the acid, cautery knife, or wire loop employed, necessitates the use of the rhinoscope. But as the hand which should hold the tongue-depressor is needed for the operating instrument, the former must either be held by the patient, or an instrument such as that shown in Fig. 40, a combined tongue-depressor and rhinoscope invented by Dr. Jarvis, has to be employed.

For the application of acids, the little instrument shown below will be found very convenient. It consists of a plated tube mounted on an ebony handle, and containing a thin rod, which is flattened near the end and curved, the bent portion being hardened so as to possess enough spring to reassume its shape after being straightened out. A slot about one inch in length, cut through the upper surface of the tube, at its point of attachment to the handle, exposes the near end of the rod, which is here furnished with a knob. This knob is perforated horizontally and perpendicularly, the holes thus formed accommodating a pin which is attached to a flattened spring, which, in turn, is bent in the shape of an arc, and is screwed to the handle. The pin fitting loosely in either of the holes, the spring and rod can be easily disconnected, and the latter's curved tip can thus be pointed in any direction, after which the pin can be inserted in the hole nearest its point. When pressed upon, the spring drives the rod before it, causing its end to protrude beyond that of the instrument, and draws it in again when the pressure is released.

Fig. 39.



Author's chromic acid applicator.

Of the three acids mentioned, chromic acid is by far the most satisfactory for posterior applications. Nitric acid is not sufficiently safe, while glacial acetic acid requires too many applications.

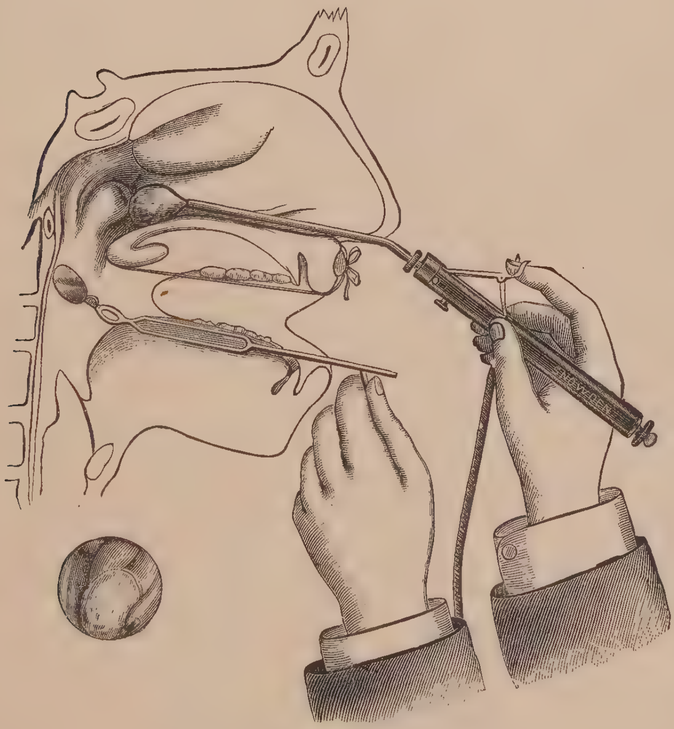
When an application is to be made, the instrument is adjusted so that the curved tip will take the proper direction on emerging, and the end of the rod is protruded. The tip is heated slightly to the fire of a match, and dipped among the crystals of the acid, then allowed to re-enter the tube. Enough of chromic acid will have adhered to the rod for the application. The tube being passed through the nasal cavity as far as the hypertrophy, the rhinoscope, held with the left hand, is placed in position, and the parts are illuminated. The location of the tube being ascertained, its point is placed against the side of the growth, and the spring is pressed upon. This forces the acid-covered point to emerge, the bend causing it to apply itself against the growth. By now drawing the instrument out a short distance, the application can be made more effective, the point thus parting with all its acid on the hypertrophied membrane as it rubs against it. The pressure on the spring being then released, the point disappears in the tube, and the instrument can be withdrawn. A solution of bicarbonate of soda, used posteriorly with the atomizer, is always indicated after this operation, to neutralize any excess of the acid that might have remained on the membrane, and to limit absorption. Four or five applications of this kind generally cause marked shrinkage of a moderate-sized growth.

Galvano-cautery can also be used in the same manner by introducing the cautery knife *d* (Fig. 33) instead of the acid application. The loop is introduced cold and applied against the side of the growth. Its position being ascertained with the rhinoscope, the circuit is closed, the handle being at the same time tilted to one side so as to cause the platinum tip to press against the hypertrophy while hot. When the tumor is large I use an electrode constructed on the principle of the chromic acid applicator the loop protruding instead of the acid covered knob.

When the hypertrophy is of the hard variety, and the use of the snare becomes necessary, preference should be given to the galvanic snare, if that can be obtained. The operation can be performed much more rapidly, and the danger of secondary hemorrhage is avoided. The rhinoscope must of course be employed as for the application of acids, the snare being held and guided with the right hand. In some cases it is necessary to retract the soft palate, in order to avoid its tendency to adapt itself against the pharynx, and interfere with the view during the application of the loop. An easy manner of accomplishing this, is to tie a piece of white tape, a foot long, to the broad end of a small-sized urethral rubber bougie, and to pass the latter through the nasal cavity until its end is seen protruding below the soft palate. Being seized with a pair of forceps, it is drawn out through the mouth, until the tape, which has, of course, followed the catheter, protrudes about as much out of the mouth as its other end protrudes through the nose. The two ends are tied sufficiently tight to leave a satisfactory space at the isthmus, and the catheter is detached. It should, if possible, be applied on the same side as the tumor, but when this cannot be done, and the other nasal cavity is alone permeable, the tape can be passed across the posterior surface of uvula and caused to emerge through the arch on the side of the hypertrophy when drawn out.

An estimate of the size of the growth having been formed, the wire loop should be made sufficiently large to slip over it with ease. In the majority of cases the growth protrudes sufficiently beyond the outline of the turbinated body to be easily caught in the loop, but at times it does not, and the wire slips over its surface without engaging it. When such is the case, the loop should be bent on the tube at an angle of about fifty degrees, before introducing it.

Fig. 40.

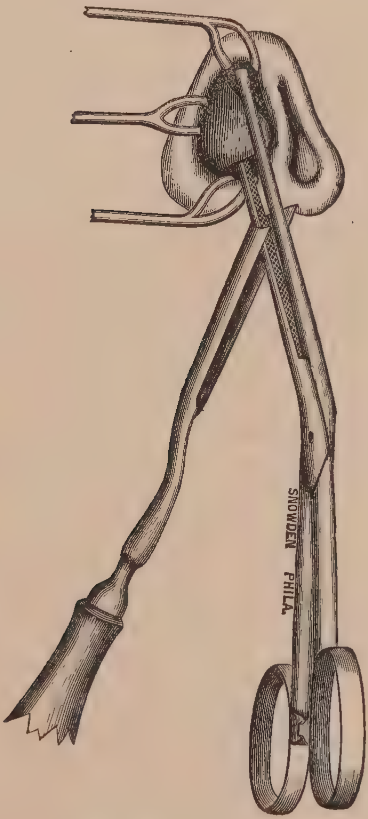


1. Author's galvano-cautery snare in position.
2. Rhinoscopic view.

When traction is produced, the loop will first straighten itself, then lean over to the opposite side, and, if properly adjusted, encircle the tumor. If the galvano-cautery snare is employed, pressure is exerted on the finger-lever as shown in Fig. 40, without, however, closing the circuit. This will cause the wire to tighten itself around the growth until a pedicle is formed. Leaving it in this position for a few moments, the rhinoscope is withdrawn, and the left hand is used to turn the milled nut at the end of the instrument. The circuit being now closed, a quarter revolution of the nut will cause the glowing wire to bury itself in the tissues, coagulating the blood in the severed vessels and preventing what hemorrhage might occur. As soon as the nut stops turning, the circuit is broken, and after waiting a couple of minutes the same process is repeated, to be again arrested and renewed until complete separation of the growth occurs. With the cold snare, the procedure is the same, only that much more time should be employed, to accomplish the operation safely. Although the chances of hemorrhage are very small in hard hypertrophies, one moderately large sinus would be sufficient to cause copious bleeding, this usually occurring some time after the operation, when the physician is not on hand to arrest it. When the loop has engaged the mass firmly, which can be ascertained by withdrawing the instrument until its progress becomes arrested by the tumor, a few turns of the milled nut will secure it. The exact position of the wire should now be determined with the rhinoscope, and if satisfactory, the nut is turned slowly until firm resistance is felt. After a few minutes another turn is given, repeating the periods of rest and traction, until the growth has been completely severed. The mass usually comes out with the snare, but when it does not the latter should be used as a probe to push it into the posterior nasal cavity, and cause it to drop through the isthmus into the mouth; or, the patient can be directed to inhale violently through the cavity operated in, the nostril of the other side being closed with the finger. An insufflation of pure tannin, practiced with the instrument shown in Fig. 25, will greatly lessen the chances of secondary hemorrhage, and the patient should be ordered a small quantity to use as snuff, should bleeding occur.

When after the foregoing measures have been resorted to, the obstruction to respiration remains pronounced through involvement of either of the turbinated bones in the hypertrophic process, a portion of the bone has to be removed. Dr. Woakes' (of London) nasal plough, shown in Fig. 41, is the most satisfactory instrument. It consists of a chisel-like blade, curved upon itself, with one of its edge-corners

Fig. 41.



Woakes' nasal plough in position.

projecting more than the other, the sharp point formed being blunted so as to avoid cutting the membrane when passed up the nostril. A pair of forceps with narrow but strong blades, so shaped as to not interfere with vision when in position, are used to grasp the edge of the bone, after which they can be locked by approximating the spring-catches near the rings. The plough is then placed with its concave surface against the blades, the latter serving as guide for it, and pushed up until the piece held in the grasp of the forceps is completely cut off. Copious hemorrhage follows the operation, but it soon stops of its own accord. The after-effects are hardly noticeable and the relief is immediate.

A local application of the four per cent. solution of cocaine prior to any of the operative procedures described, facilitates them greatly. The membrane is not only anæsthetized, but the contraction it undergoes increases markedly the lumen of the cavity, rendering the introduction of instruments much easier and less annoying to the patient. By constringing the blood-vessels, it limits to its simplest expression the local blood-supply, diminishing greatly the momentary hemorrhage following cutting operations, if not entirely preventing it.

ATROPHIC RHINITIS.

(Synonyms:—Dry Catarrh; Atrophic Catarrh.)

Etiology.—Atrophy of the mucous membrane of the nose occurs as an occasional result of hypertrophic rhinitis. It may present itself early or late in the course of the affection, this depending on the nature of the original irritating cause, and upon the surroundings of the patient. An abnormally dry state of the atmosphere, such as that furnished by the hot-air heaters in such common use in this country, and the continued inhalation of tobacco or of other smokes, causing rapid evaporation of the secretions, encourages its development. Abnormal patency of the nasal chambers, by facilitating the accumulation of irritating and desiccating agents, or by lessening the power of the exhaled current when the nose is blown, thus allowing the accumulation of discharges, tends to produce the affection. It may be bilateral or unilateral, the other cavity in the latter case not having as yet merged into the atrophic process.

Pathology.—When the affection occurs as a result of hypertrophic rhinitis, the pressure exerted by the adventitious cellular tissue upon the glands and blood-vessels, causes interference with, or destruction of the former, and gradual absorption of the latter. As the destruction of the glandular elements progresses, the surface of the membrane becomes more and more deprived of the lubricating action of their secretion, and is thus exposed to the direct action of the irritating agents, which now remain in contact with it. As a consequence, superficial desiccation occurs, pressure is exerted upon the layers beneath, and this, coupled with the diminished nutrition occurring as a result of the decreased blood-supply, sooner or later produces absorption of the greater part of the membrane, including the corpora cavernosa, and frequently the turbinated bones.

Those glands which are principally affected by the external irritant become engorged, and their apertures are the seat of minute abscesses. Owing to their great number and their close proximity, the latter form suppurative areas, over which the purulent discharges accumulate into masses more or less thick. The contact of these masses soon destroys the underlying ciliated epithelium, the cells of which are shed abundantly, and the discharges not being softened by mucus, or propelled by the to-and-fro motion of the ciliæ, remain over the seat of their production, to become dry crusts by the evaporation of their watery constituents, until they are of sufficient thickness to be loosened by the exhaled current of air and discharged.

Symptoms.—The symptoms of atrophic rhinitis may be said to be almost negative, the nasal respiration being perfect. When the affection is of long standing, a sensation of dryness or parchedness in the nostrils or pharyngeal vault causes great annoyance, and the sufferer makes strenuous efforts to relieve this by blowing his nose, frequently depresses his upper lip to stretch the membrane, or by inserting a finger into either cavity, endeavors to stimulate the parts and relieve a sensation of intense itching principally located over the septum. Frontal headache is frequently induced, or, if present, it is aggravated by exposure to cold air or to noxious fumes, dust, etc., the membrane having become extremely sensitive to external irritation, through the paucity of mucus to protect it. This lack of fluid involving also the olfactory membrane, the odoriferous particles are not dissolved, and the sense of smell is consequently obtunded or lost.

The principal symptom, and the one which causes the patient to apply for treatment, is the impure character of the breath. This cannot be said, however, to be positively fetid, but is sufficiently disagreeable to render close proximity unpleasant. It is quite characteristic of the affection, and once smelt, can be readily recognized. In the majority of cases the patient is cognizant of his infirmity, and is rendered very unhappy by it. Thin, scaly crusts of a greenish-gray color, sometimes tinged with blood, are frequently discharged anteriorly, and sometimes posteriorly through the mouth. As the disease advances, however, these crusts become much thicker, and are discharged in the shape of flakes, which present at times a perfect cast of the surface which they covered.

Anterior rhinoscopy reveals an abnormal spaciousness of one or both cavities, varying with the duration of the disease. The color of the membrane is about normal, but as the latter becomes congested upon the least irritation, it usually appears red, through the efforts of the patient to clear his nose preparatory to the examination. The scabs described may be seen on either or both sides of the cavity examined, and, adhering tenaciously to the site of their formation, are removed with difficulty, even with the probe. When the disease is of long standing, the turbinated bones may be so absorbed as to hardly appear. The pharyngeal vault can be seen from the front, and upon being examined posteriorly, presents the same appearances as the anterior cavities, except that the membrane is frequently glazed and parched, this condition extending in a large proportion of the cases to the lower pharynx. Scabs can be seen adhering to the membrane in the sinuosities of the fossæ, around the margin of the posterior nares, and upon the superior surface of the soft palate.

Prognosis.—Atrophic rhinitis is perhaps the most unsatisfactory of the nasal affections to treat successfully. The diminished vitality of the membrane, its deficient blood-supply, the loss of the epithelium, and the absence of the lubricating glands, are obstacles which are overcome with difficulty and which require time and patience to influence. Fortunately, the most disagreeable symptom to the patient—the tainted breath—can be so kept in abeyance as to relieve him of mental anxiety. There is no doubt, however, that under appropriate and steady treatment, the condition can be so improved as to not be a source of annoyance. The affection is rarely troublesome after middle age.

Treatment.—The most important portion of the treatment of atrophic rhinitis is to keep the nasal cavities as free as possible from crusts. To accomplish this, the douche (Fig. 15) is very satisfactory, especially if used posteriorly and when the crusts are not too adhesive. In the latter case, Hall's syringe (Fig. 16), with either Cohen's post-nasal tube or that shown in Fig. 30, will be found invaluable. Its continuous stream, the force and rapidity of which can be controlled at will, is well calculated to drench the parts thoroughly and to force the scabs from their berth.

Much benefit can be procured by a proper selection of the ingredients to be used in the cleansing solution. These must possess solvent and slightly stimulating properties, the former to facilitate the removal of the crusts by softening their edges and penetrating underneath, the latter to encourage the formation of new blood-vessels by stimulating those which have remained in a healthy state, thereby increasing nutrition and the formation of regenerative elements, and enhancing the action of the active treatment. Borax possesses both qualities, in addition to that of being an excellent disinfectant, and can be used with good effect in light cases. But when the disease is more advanced, more stimulation is necessary to influence the dormant vessels, and a more powerful antiseptic is required to correct the impurity of the breath. The following formula fulfills these objects very satisfactorily:

℞. Sodii Boracis		Facilitates the removal of the crusts by increasing the solvent property of the liquid.
Ammonii Chlor.	āā ℈j	Stimulates the blood-vessels and the glandular elements to action, and tends to relieve their engorgement.
Potassii Permang.	gr. x.	Powerful disinfectant. Stimulates the superficial vessels, and encourages resolution of suppurative areas.

M. Sig.—To be dissolved in one pint of water at 100° F.

This should be used by the patient at regular intervals, three times daily, if the formation of crusts is rapid. If the latter are few in number, however, twice a day will suffice. Used faithfully, this solution is sometimes sufficient to restore the membrane to a comparatively healthy state, that is to say, as far as the patient's comfort is concerned; but its use has to be continued for a long time, in some cases one, and in others two or three years. Occasionally the ablutions must become a permanent part of the daily toilet, to avoid impure breath, once daily being sufficient, however, to keep the cavities free from scabs. Carbolic acid might sometimes be used with good effect, but its odor renders it objectionable to most patients. Phénol-sodique, one tablespoonful to the pint of water, takes its place advantageously, without leaving a disagreeable smell.

Before instituting active treatment, the patient should be allowed to use the cleansing solution a few days, after which the crusts will be detached with more facility. Directing him not to use the wash at least three hours before his next visit, sufficient discharge will mark each suppurative area to indicate where the applications are to be made. The nostrils being well dilated and illuminated, each scab should be carefully raised (or wiped off with a cotton pledget if too soft to be raised) with a probe, such as Bosworth's (Fig. 31). Another probe of the same kind, previously covered with cotton and dipped into the solution used, or the galvano-caustic knife, is then introduced, and each spot is touched separately and carefully. In my practice, I have used the galvano-cautery knife *d* (Fig. 33) at white heat, as recommended by Fraenkel, applying its flat surface to each suppurative area. In order to do this, however, the battery must be sufficiently powerful to heat the platinum knife suddenly, notwithstanding the local moisture. The knife is introduced cold, and as soon as it is properly located the circuit is closed. The result is immediate cessation of the discharge and complete alteration of the morbid process, while no cicatricial formation occurs. Not more than two spots should be cauterized on each side at one sitting.

The next best agent to galvano-cautery is a fifty per cent. solution of glacial acetic acid. This remedy seems to modify the suppurative process, changing the character of the discharges from the thick consistence described to that of a glairy mucus. In some cases, where the suppuration is great, the pure acid may be used, taking care not to touch the surrounding surfaces. It does not act here as an escharotic as in hypertrophic rhinitis. This is probably due to the fact that in the latter affection, the epithelial covering, for which glacial acetic acid has great affinity, is generally intact, while in the former, especially in the suppurative areas, it has disappeared.

Cotton-wool tampons, as suggested by Gottstein, are often very effective. They can be introduced by means of a probe, a pellet as large as the first phalanx of the little finger being massed in the cavity, leaving a breathing space between it and the floor of the nose. Its presence induces a certain amount of irritation, which causes copious flow of mucus; this not only keeps the membrane moist, but prevents desiccation of the discharges. Some cases become so accustomed to their presence that they can bear them the greater part of the day, changing them now and then. In the majority of cases, however, one hour in the morning and one in the evening will suffice.

The essential oils of tar, cubebs and eucalyptus, used for five minutes three times a day with the auto-insufflator (Fig. 27), are frequently productive of good effect. They stimulate the glandular elements and thus encourage the flow of lubricating fluids. The stimulating action of a weak

PLATE III.

PLATE III.

Figure 1.—Female, æt. 23; posterior view of large posterior hypertrophy of left inferior turbinated body; removed with snare. Patient referred by Dr. B. F. McElroy.

Figure 2.—Female, æt. 26; hypertrophy of middle and inferior turbinated bodies, both sides, causing bilateral stenosis; removed with snare. Case referred by Dr. M. O'Hara.

Figure 3.—Dr. Lefferts' (of New York) case of complete occlusion of both nasal cavities by hypertrophies, complicated with adenoid vegetations of the vault.

Figure 4.—Lateral section of pharynx and larynx; *g*, Section of mass of hypertrophied adenoid tissue of the naso-pharynx seen in Fig. 6 (uvula cut off).

Figure 5.—Anterior section of above, showing relation between nasal cavities and the larynx. (The vocal bands in the latter are in the cadaveric position)—

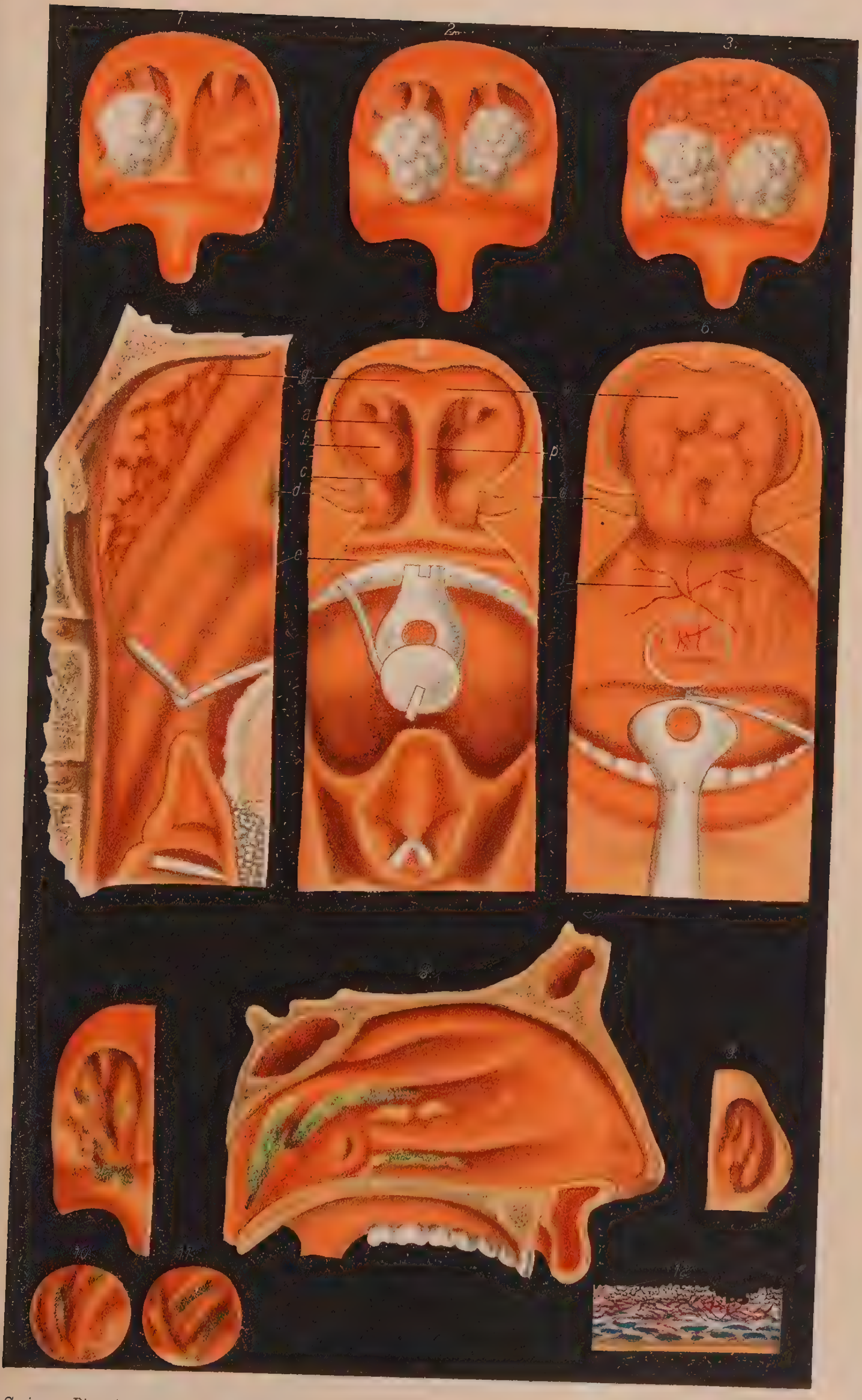
a, Superior turbinated bone.
b, Middle " "
c, Inferior " "
d, Orifice of Eustachian tube.
e, Junction of hard and soft palate (the latter being cut off).
g, Anterior portion of the pharyngeal vault or posterior nasal cavity.
p, Posterior aspect of septum.

Figure 6.—Posterior section of pharynx, showing mass of hypertrophied tissue in the posterior portion of the pharyngeal vault, as seen in a patient in whom congenital absence of the uvula existed.

Figure 7.—Posterior view of left cavity in atrophic rhinitis.
" 8.—Lateral " " " " "
" 9.—Anterior " " " " "
" 10.—Rhinoscopic view of left cavity. " "
" 11.— " " " " mirror slightly turned.
" 12.—Microscopical section of the mucous membrane in atrophic rhinitis.

[Note.—The Nos. 4, 5 and 6 had to be shortened one inch from below the Eustachian prominences so as to enable them to be represented. The other proportions are accurate.]

Plate III



Sajous, Pinxit.

Burk & Mc Fetridge, Lith. Phila

solution of nitrate of silver applied three times daily with a cotton pledget, is sometimes of great benefit. It induces the formation of new elements in the membrane and causes prompt resolution of the suppurative areas. A preparation called "Listerine", a combination of the essential oils of eucalyptus, gaultheria, thyme, etc., and benzo-boracic acid, is principally efficient when the membrane is not too sensitive. Mixed with equal parts of water, it serves as an excellent disinfectant and gentle stimulant.

Irritating medicines in the form of powder are warmly advocated by some specialists. Not having found them satisfactory in my practice in this class of cases, I cannot recommend them. A momentary relief is experienced, but this is of short duration and is usually followed by increased dryness.

CHAPTER VII.

DISEASES OF THE ANTERIOR NASAL CAVITIES.—*(Continued.)*

SYPHILITIC RHINITIS.

(Synonyms:—Specific Rhinitis; Specific Catarrh; Syphilitic Ozœna.)

Etiology.—As indicated by its name, this affection occurs as an inflammatory process induced by syphilitic intoxication. It may be primary through contamination by direct contact of the mucous membrane of the nostrils with syphilitic matter. It frequently presents itself as a symptom of the secondary period, occurring usually between two and nine months after the primary infection, although occasionally it follows it sufficiently early to be considered by some authors as forming part of it. As a manifestation of tertiary syphilis, the affection rarely presents itself until several years after the initial stage, twenty and thirty years frequently elapsing. Syphilitic rhinitis also occurs as a result of heredity.

Pathology.—Lesions occurring on the surface and in the layers of mucous membrane in general, are all of an inflammatory character. In the nose, as in the other portions of the mucous tract, the eruptions are analogous to, and often coincide with, those appearing on the skin, their appearance being modified by the structure of the membrane, its functions, and the presence of more or less irritating secretions. The superficial lesions may present themselves as a mere local hyperæmia of short duration, or in the shape of papular protuberances which rapidly lose their epithelium and present the appearance of erosions, or as round or oval erythematous patches, the epithelium of which comes off, after having degenerated into muco-pus, leaving the membrane proper bare and reduced to a secreting surface of an ashy color and of a granular aspect. Left to themselves, these patches, which are manifestations of the so-called secondary period, and the most frequently met with in the nose, gradually spread, bulge out, or become cup-shaped, and secrete quantities of yellow, offensive muco-pus, which adheres closely to them. They are almost always surrounded by a red areola, indicating circuitous congestion. When the lesions are deeper-seated as a result of tertiary syphilis, all the layers of the membrane become infiltrated and an hypertrophic process involving the blood-vessels and glandulæ begins, followed by the deposition, in the meshes of the new elements, of quantities of small proliferating round cells, which are thought to be characteristic of syphilis. This hypertrophic process being unevenly distributed, nodules are formed, which soon ulcerate through the pressure exerted upon the blood-vessels by the adventitious elements themselves. This ulceration may end in resolution, and be followed by cicatricial contraction, or the underlying perichondrium or periosteum may become involved in the ulcerative process, and necrosis of the cartilage or bone follow. The septum, the turbinated bones, and the ethmoid are more predisposed to necrosis than other portions of the skeleton. While the process may start in the mucous membrane, as stated, the diathetic influence may be exerted on the bones or cartilages primarily.

Symptoms.—When the affection is primary, *i.e.*, a result of direct contamination, the local process follows the same course as in other parts, the initial sore and the inflammation causing swelling of the nose, pain, difficult nasal respiration, and fever.

As a symptom of the secondary form of the systemic disease, syphilitic rhinitis usually begins with an attack of mild coryza, which gradually increases in intensity and soon assumes the stage of purulent exudation. Examined anteriorly, the membrane appears puffy and congested, with here and there a mass of greenish-yellow discharge, which emits a peculiar fetid odor, quite characteristic of syphilis. Later on, this discharge becomes sanguinolent, and close examination anteriorly and posteriorly reveals patches, which at first are of a darker hue than the surrounding membrane, but soon assume an ashy-gray color. These patches are covered with masses of the yellow secretion alluded to, and are generally surrounded by abnormal redness. The discharges being frequently drawn down along the wall of the pharynx, the latter may become involved in the inflammatory process and undergo ulceration. The larynx is also exposed to the same danger.

In the tertiary form of the affection, the deep-seated origin of the pathogenic process causes the ulceration immediately to assume a formidable character. After a local swelling of varying magnitude, generally accompanied by local pain and swelling, a deep ulcer makes its appearance, with ragged edges, and surrounded by a red, angry-looking areola. The discharge covering the ulcerations is greenish-yellow, often streaked with blood and studded with shreds of necrosed tissue. Its tendency to become rapidly desiccated causes it to be soon turned into crusts, which adhere tenaciously to the ulcer, and impart to the breath an odor, the fetidity of which is beyond description. The ulceration may eventually undergo resolution, or the underlying bone or cartilage become affected by the inflammatory process. The cartilage of the septum is usually the first to disappear, causing depression of the tip of the nose; the vomer soon follows, and the patient becomes permanently disfigured by a flattened nose. The turbinated bones gradually slough away, or become detached whole or in the shape of spiculæ. In two cases in the author's practice, the antra of Highmore were penetrated, and could be examined with the assistance of a small rhinoscope introduced through the anterior nares. In aggravated cases the bony and cartilaginous structures of the entire cavity may disappear, the soft parts being sometimes included, so that the anterior nasal cavities are represented by an irregular hole in the centre of the face. The floor of the nose is often perforated, giving rise to great interference with speech, and rendering deglutition difficult, especially that of liquids, which are frequently forced into the nasal cavity. The disease may extend to any of the osseous structures, slowly destroying them, until the cranial cavity is penetrated. As soon as necrosis of the cartilages or the bones begins, the odor of the breath changes in character, and becomes so penetrating that prolonged ventilation of the apartments in which the patient may have remained only a few moments becomes peremptory.

Hereditary syphilis of the nose generally presents itself at the time of birth or soon after, or in the second decade of life. In girls it often manifests itself at the approach of puberty. In the infant, its symptoms are those of the coryza of nurslings at first, soon aggravated by the character of the discharges, which, becoming muco-purulent, cause excoriation of the upper lip. The trouble shows little tendency to subside, and if left to itself, generally assumes a dangerous character. The bones of the nose are in danger of being necrosed, causing permanent disfigurement, while extension of the necrosis to the bony surfaces in close proximity to the brain may follow, rendering a fatal issue most likely if penetration occurs. In youths, the disease progresses as if it were the tertiary manifestation of direct contamination.

Prognosis.—The affection being the result of a systemic dyscrasia, a cure, in the true sense of the word, could only be expected if the latter were curable. This being out of the question, we can but subdue the local manifestation. With this object in view, the prognosis may be said to be very favorable, provided the patient be not too exhausted to withstand the necessarily active treatment.

As a result of the ulcerative process, bands of cicatricial tissue may compromise seriously the functions of the parts, including the Eustachian tubes, the pharyngeal apertures of which may be completely closed.

Treatment.—The patients rarely, if ever, present themselves at the onset of the local trouble, ascribing the early symptoms to a slight cold, etc., and generally do so when the impediment to the nasal respiration, the fetid breath, or the pain have persisted for some time. The history of the case, coupled with the objective symptoms, generally renders a proper diagnosis easy; at times, however, the presence of syphilis cannot be ascertained from the patient, especially when it is the result of heredity. Dependence must then be placed on the character of the ulceration. In secondary manifestations, the color of the mucous patches is quite characteristic; in the tertiary, the nature of the ulcer, its excavated surface with everted edges, the color of the discharge and its odor, furnish sufficient evidence to render the differential diagnosis positive. When necrosed bone is present, the penetrating odor of the breath furnishes unmistakable evidence, which can be verified by the use of the probe.

Unlike in the affections previously described, systemic medication is of primary importance, while local measures are valuable to limit the ulceration, and frequent cleansing contributes to the patient's comfort and prevents inflammatory contamination of the surrounding parts. In secondary syphilis of the nose, resolution frequently takes place without the assistance of remedies, the site of a patch being marked by a cicatrix which eventually disappears. At times, however, ulcerations assume the form of vegetations, which retard greatly the recovery. The red iodide of mercury, administered in doses of one-sixteenth of a grain three times daily, has in my hands produced the most satisfactory results. It should be continued until the first evidences of ptyalism occur, when a course of iodide of potassium will be of service to eliminate it from the system. Locally, the nitrate of silver, fused on the end of a heated aluminium wire, causes rapid obliteration of the ulcerations by destroying the ulcerative surface and stimulating the absorbents. As a cleansing solution, that described page 118, used with the douche or with Hall's syringe, is very efficient in keeping the cavities clear, and as a disinfectant.

In the tertiary form of the affection, mercurial preparations are not nearly so effective as the iodide of potassium, but the latter must be given in full doses. Beginning with ten grains three times a day, one grain is added to each dose until two scruples are administered each time. Iodism generally supervenes when the half of that quantity is taken, but I have not found it disadvantageous to continue the administration of the iodide, notwithstanding the eruption and the coryza. On the contrary, the latter, by increasing the natural flow of mucus, prevents desiccation of the discharges, and renders their elimination much easier. The continuation of the treatment is guided by the effect produced, and as soon as evidence appears that the remedy is mastering the disease, the dose should be decreased as it was increased, one grain each time.

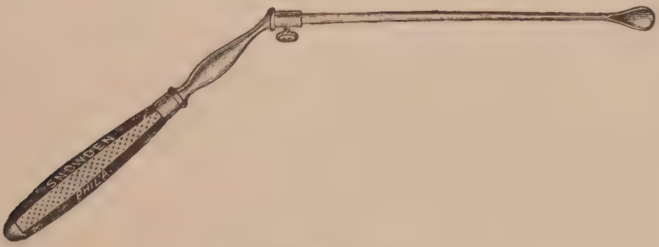
The constitutional treatment should be assisted by such local measures as the state of the nasal cavities may warrant. Cleanliness, obtained by means of the solution recommended for the secondary form is essential. It not only corrects the fetor of the breath, but assists the local curative process.

Considerable difficulty is occasionally experienced in removing the crusts, and the physician is sometimes obliged to extricate them himself by means of slender forceps, after having softened the masses with a saturated solution of bicarbonate of sodium, applied with the atomizer. This is, of course, only necessary when the patient is first seen, as after that, sufficiently frequent cleansing will prevent the accumulation of discharges and their desiccation.

The application of the solid nitrate of silver is as serviceable in this form of syphilis as it is in the secondary. Its stimulating properties are here of the greatest value, and, in conjunction with the internal treatment, soon cause resolution of the ulcer. Iodoform, insufflated three times a day by the patient himself, is also very valuable, but its disagreeable odor renders it objectionable to the majority of patients.

When necrosis of the cartilages or bones is present, the pungent character of the breath is prevented with difficulty, and sometimes can hardly be modified. Carbolic acid (gr. v–℥j), phénol-sodique (ʒj–℥j), and permanganate of potassium (gr. v–℥j), used with Hall's syringe, have been the most serviceable in my hands for the purpose. More effective than all, however, and the essential condition for a successful local treatment, is the immediate removal of the dead portions of the cartilage or bone. The cartilage of the septum is generally the first to become affected, and that at its line of union with the vomer. A fistulous opening usually covers the seat of necrosis, and serves for the introduction of the probe. When the characteristic sensation of roughness is felt, the opening is enlarged sufficiently to allow the introduction of the instrument shown in Fig. 42. The sharp edge of the spoon being applied to the rough surface, this is gently scraped, taking care not to exert too much pressure, lest penetration occur. When the surface is smooth, the edges of the fistulous surface are trimmed with a sharp bistoury, and the wound being left to itself, heals without further trouble. The same procedure can be employed for superficial necroses situated in the portions of the cavities accessible anteriorly. When a loose piece of bone can be detected, the fistulous opening should be sufficiently enlarged to allow its withdrawal.

Fig. 42.



Volkmann's curette.

In many cases the septum is perforated, and the circumference of the opening presents a rough edge of carious cartilage or bone, which breaks down very slowly and maintains a profuse discharge. The septal punch, shown in the chapter on the diseases of the septum, can be utilized, the semi-lunar blade serving to cut the irregular edges away, or the sharp spoon can be used to scrape them down until normal cartilage or bone is felt. When the turbinated bones, the vomer, and the perpendicular plate of the ethmoid are involved, ordinary dressing forceps can be employed to extract the diseased bone or break the necrosed portion, which usually projects into the cavity. They sometimes become detached of their own accord, and instances have been reported in which large portions of dead bone had fallen into the larynx and caused dangerous symptoms.

In hereditary syphilis of the nose, the symptoms follow the same course as in the tertiary form, and are treated in the same manner. When syphilitic rhinitis occurs in the infant, calomel seems to exert the most satisfactory influence, administered in doses of from one-half to two grains three times daily, according to the age, with one to three grains of bismuth to prevent diarrhœa. The nose should be kept as clean as possible, a difficult matter in young children. Sneezing, induced by tickling the nostril with a feather or any other harmless object, is sometimes very effective, the sudden blast causing the contents of the nose to emerge on the upper lip; or, a small syringe may be used to absorb the discharge, while absorbent cotton or a piece of blotting paper can also serve for the same purpose. A spray of the carbolic acid solution (gr. i–℥j) or of that of the permanganate of potassium (gr. iii–℥j), often succeed, in conjunction with the internal treatment, in arresting the affection in a very short time. When the ulcerations are persistent, iodoform, applied with the auto-insufflator (Fig. 27), by the mother or attendant, can be added with advantage.

SCROFULOUS RHINITIS.

(Synonyms:—Fetid Coryza; Scrofulous Ozœna; Ozœna; Fetid Catarrh; Strumous Catarrh.)

Etiology.—As its name implies, scrofulous rhinitis finds its origin in a constitutional weakness, a depressed state of vitality through which resistance to external influence is diminished. This state of debility may be due to inherited scrofula, or occur as a sequel to eruptive affections such as measles, scarlatina, smallpox, diphtheria, etc.

Pathology.—The abnormal susceptibility of scrofulous subjects to inflammation and the tendency to relapse peculiar to all scrofulous affections, readily explain the onset of rhinitis and its continuation. This susceptibility, although more or less general, being frequently most marked in the mucous membranes, the exposed position of the nasal cavities to atmospheric perturbations and to external irritants, furnishes an explanation for the almost universal prevalence of rhinitis in persons of a scrofulous diathesis. In scrofulous inflammation, there is a remarkable tendency to permanent infiltration of the affected tissues, which infiltration is much less readily absorbed than in the healthy subject. There being little or no tendency to the development of new blood-vessels, nutrition of the adventitious elements is not carried on, and the organization of new connective tissue does not take place, as in hypertrophic rhinitis, for instance. The infiltration is sometimes so great that the corpuscles, which are much larger than in normal exudation, fill the sub-epithelial layer, penetrating sometimes to the sub-mucous layer, and many are thrown out on the surface, after having undergone a granulo-fatty degeneration. These, with what mucus may be secreted, form a thick, adhesive secretion, possessing to a high degree fermentative properties, and tending to form scabs. Its irritating nature compromises the ciliated epithelium, which, as in the preceding affection, is abundantly shed, and the physiological properties of the latter not being performed, the discharges accumulate in the sinuosities of the fossæ, to form there, fetid masses which contaminate the exhaled breath. The mucous membrane of the accessory cavities takes part in the pathological process when the affection is of an aggravated form.

Symptoms.—The most prominent symptom of scrofulous rhinitis is the fetid discharge. This may be slight or great in quantity, but the latter is most frequently the case. It is voided anteriorly and posteriorly in the shape of scabs or lumps, which are of a greenish-brown color, sometimes tinged with blood, and frequently preserving the conformation of the surface which they covered. The fetidity of the odor they emit depends upon the length of time the mass has lain in the sinuosities of the cavity, undergoing decomposition. When the evaporation of its watery constituents has reduced its density so that it will preserve its shape, the emanations from it are almost intolerable. When they are *in situ*, each breath becomes saturated with the foul odor; the inhalations infect the patient, the exhalations the surroundings, and make the presence of the sufferer almost unendurable. The mental suffering of a sensitive person afflicted with this disease is generally very great. The cognizance of his infirmity causes him to shun the society of his friends, and the constant dread of rendering himself obnoxious leads him to seek a life of solitude. This, coupled with the toxic effect of the impure breath he is forced to inhale, generally impairs his health; his complexion is sallow, his bowels irregular, and occasional febrile manifestations occur, principally towards evening. In some cases, the exhalations seem to be permanently foul, this being probably due to a constitutional idiosyncrasy which may be compared to that manifested in certain individuals who suffer from offensive perspiration of the feet and axillæ, which is constantly present, notwithstanding the most scrupulous cleanliness. The nasal discharge may not be profuse, but it is prone to desiccate rapidly, and to adhere tenaciously to the surface of the membrane, in which case the breath is particularly offensive, sufficiently so, sometimes, to impregnate the air of a large room. The patient seldom perceives the fetidity of his own breath. The other symptoms correspond somewhat with those occurring in atrophic rhinitis. The sense of smell is frequently blunted, this condition being probably due to infiltration of the sub-epithelial layer of the olfactory area. That of taste is necessarily often compromised. Frontal headache is sometimes very distressing, indicating involvement of the frontal sinus. When the antrum takes part in the inflammatory process, pains over the malar bones may be present, complicated with supra-orbital neuralgia. Implication of the sphenoidal sinus occasionally gives rise to a dull headache, located on the top of the head. When the affection involves the accessory cavities, especially the last-named, defective memory is frequently complained of. The Eustachian tubes are sometimes involved, catarrhal deafness occurring in a small proportion of the cases.

Anterior inspection of the nasal cavities will generally reveal a condition resembling somewhat that of atrophic rhinitis. They are usually capacious, the ill-nourished membrane having shrunken under the pressure of the desiccated discharges. Their color varies from the normal to that induced by marked congestion. At times, however, the cavities are almost normal, the lumps of muco-purulent discharge alone testifying to the presence of the affection. Posteriorly, the appearance, as to color, corresponds with that of the anterior cavities. The fossæ of Rosenmüller are sometimes obliterated through the excessive infiltration, and the vault is studded here and there with purulent masses more or less advanced in the process of decomposition.

Prognosis.—The affection being more systemic than local, the complete eradication of the nasal trouble could only be expected were we able to rid the system of the scrofulous diathesis. As this is now considered beyond our means, we can but mitigate the intensity of the local trouble, and place our patient in a condition of comparative comfort. As he becomes older, the disease moderates in severity, disappearing entirely in the majority of cases when adult life has been attained.

Treatment.—Much benefit can be produced by efficient local cleansing, strict attention to hygienic measures, and by the internal use of alteratives and tonics. The nasal douche is, in my opinion, the most efficient instrument, while Hall's syringe (Fig. 16) becomes necessary when the tendency to desiccation is great and the crusts are difficult to detach. The cleansing solution described on page 118 has been more satisfactory in my hands than any other, its stimulating properties contributing greatly to the limitation of the discharges. The frequency of its use depends upon the amount of secretion, three times daily usually sufficing to keep the cavities free.

The hygienic measures consist in the maintenance of bodily cleanliness, thus encouraging the secretory functions of the skin. Frequent bathing, alternating the ordinary tepid bath with one of salt water, made by dissolving one pound of rock salt in the quantity of water generally employed, stimulates the capillary circulation of the skin, especially when vigorous friction is practiced over the whole body, after drying it thoroughly. A well regulated diet is also of importance, coupled with due attention to proper intestinal action.

The internal treatment should be guided by the condition of the patient as to general health. If he is not too weak to bear them, alteratives are sometimes productive of excellent results. The syrup of iodide of iron, gradually increased from five drops to thirty drops, three times daily after meals, has in my hands caused recovery of the senses of smell and taste in a patient in whom they had been lost ten months, this action being probably due to absorption of the infiltration in the layers of the olfactory region. Its administration can be continued for weeks, until marked iodism occurs, when the dose can be gradually decreased, to be again steadily increased when the minimum dose has been reached. Tonic doses of bichloride of mercury (gr. $\frac{1}{80}$) administered three times a day, act more rapidly in some cases. Both of these agents should as much as possible be employed in connection with a generous diet. When marked anæmia is present, the tone of the system should be improved by the administration of tonics and chalybeates. Quinine, iron, and strychnia, or the syrup of hypophosphites (preferably Fellows'), Fowler's solution of arsenic (m. v.), used alternately three weeks each, have produced excellent effects. Oleo-resin of cubebs, ten drops on a lump of sugar every four hours, seemed to moderate the discharge.

Local treatment is not as effective in this affection as in those described in the preceding chapter. This may be accounted for by the degenerated state of the membrane, the absorbing powers of which are decreased, owing to the paucity of blood-vessels. Calomel, fifteen grains to four drachms of sugar, as recommended by Trousseau, is effective in some cases. The glycerite of carbolized iodo-tannin, described on page 76, has been of benefit in some cases, limiting the discharges permanently in several of them. The galvano-cautery knife, applied flatwise here and there to the membrane, reduced the secretion markedly in the cases in which it was tried.

CHAPTER VIII.

DISEASES OF THE ANTERIOR NASAL CAVITIES.—(*Continued.*)

TUMORS.

The anterior nasal cavities are occasionally the seat of tumors, which, in the majority of cases, arise primarily within them, or may involve them secondarily through extension from the accessory cavities or other neighboring regions. They may be benign or malignant, the former being by far the most frequently met with. Among the benign growths, the most common form is the nasal polypus, of which there are two varieties, the *myxoma*, or soft mucous polypus, and the *fibroma*, or hard fibrous polypus. The *papilloma*, or warty tumor, and *cysts*, are also benign growths, while the *ecchondroma*, or cartilaginous tumor, and the *osteoma* and *exostosis*, or osseous growths, can also be classified among the non-malignant neoplasms. The malignant tumors, which fortunately invade the nasal cavities but rarely, are the *sarcoma* and the *carcinoma*.

MYXOMATA, OR MUCOUS POLYPI.

Mucous polypi are most frequently found growing on the upper or lower surface of the middle and inferior turbinated bodies, and sometimes the superior. They occasionally spring from the accessory cavities, especially the frontal sinus, penetrating into the nose through the communicating canal or aperture which connects them; but they very rarely grow from the septum. They are at first sessile, but as they grow, their increase in size, which is usually very slow, manifests itself principally at the extremity, so that a neck is formed close to their point of attachment, which gives the growth the shape of a pear. This is not always the case, however, a small proportion of polypi having a broad base. As they grow, they assume the shape of the surrounding spaces, and penetrate into them.

Etiology.—Mucous polypi are generally considered to be due to chronic inflammation of the Schneiderian membrane. Intra-nasal pressure, owing to narrowness of the cavities or to a deviation of the septum, seems to favor their formation They are seldom seen in children, and are somewhat more frequent in males than females. No underlying dyscrasia, syphilitic or scrofulous, seems to influence their growth.

Pathology.—Gelatinous polypi grow by a localized increase of the submucous layer with its epithelial covering, the glands of which may either be absorbed, undergo cystic dilatation or hypertrophy, or remain in their natural state. This epithelial layer forms the outside covering of the growth. which is otherwise mainly composed of a gelatinous substance, very rich in mucine, containing bundles of connective tissue, cells, glandular and epithelial elements, and sparsely supplied with blood-vessels, excepting at the point of attachment, which is very vascular.

Symptoms.—The symptoms occasioned by the presence of nasal polypi depend upon their position in the cavities and upon the size the tumors have attained. At first, no discomfort is experienced; but as the growth increases in size, the lumen of the cavity is more and more compromised, and respiration through the nose is rendered proportionately difficult. When the weather is damp, the hygroscopic nature of polypi causes them to increase in bulk, and the obstruction is proportionately marked until fair weather returns. At times, the position of a large polypus causes it to act like a valve in the cavity, so that expiration may be freer than inspiration, or *vice versa.* This, however, is only a passing symptom, which disappears as soon as the polypus becomes sufficiently large to occlude the cavity permanently. When such is the case, however, damp weather, by increasing the intra-nasal pressure through its dilating influence on the growth, frequently occasions frontal headache, violent attacks of sneezing, and such reflex symptoms as cough, asthma, facial neuralgia, fugitive pains in the neck and chest, and other portions of the thorax. A profuse whitish discharge is usually present, which gives the breath a peculiar mousy odor, and which, through its irritating character, frequently excoriates the margins of the nostrils. The sense of smell is greatly impaired in most cases, and abolished when complete occlusion takes place. while that of taste is implicated in proportion. The voice becomes nasal, according to the degree of obstruction. The conjunctiva is generally congested, and lachrymation is present when the tear duct is occluded by the presence of the polypi, or by the local inflammatory process. Hemorrhage is an occasional symptom. When polypi attain a very large size, they may induce lateral expansion of the nose and partial absorption by pressure, of the mucous membrane, and even of the turbinated bones, a fact confirmed by a case under my care. Reflex asthma is occasionally due to the presence of nasal polypi, as first shown by Voltolini in 1872, through the pressure upon, or irritation of, the posterior ends of the turbinated bones. Cough may also have the same origin, as demonstrated by J. N. Mackenzie.

Mucous polypi are of grayish-white, pearly color, sometimes tinged with pink, semi-translucent, and somewhat resembling an oyster. Occasionally they appear decidedly red, owing to great vascularity. When pressed upon with a probe, they are easily indented, but they soon resume their normal shape.

Prognosis.—Soft polypi present no danger to life, but their presence causes great annoyance to the patient and compromises more or less the senses of smell, taste, and hearing. Deformity of the features through the mechanical expansion which they occasion is of very rare occurrence. They occasionally degenerate into sarcoma.

The danger of recurrence after their evulsion by mechanical means is very great, unless the point of origin be within reach to receive thorough prophylactic treatment. The fact, however, that polypi most frequently grow in the deep recesses of the meati, increases the liability to recurrence, through the difficulties presented to the introduction of instruments.

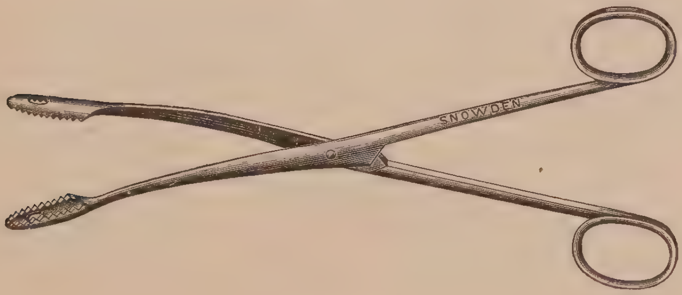
Treatment.—Gelatinous polypi may be treated by medicinal or surgical means. When there is much discharge and momentary obstruction by hygroscopic swelling of the growths, a powder composed of equal parts of alum, tannin, and pulverized extract of coca, has several times proven beneficial in restoring whatever degree of nasal respiration was usually present, and when continued for a length has seemed to reduce the polypi. It should be used as a snuff, four times daily, the auto-insufflator (Fig. 27) being convenient for the purpose. Daily applications of the tincture of the chloride of iron, applied by means of Bosworth's probe (Fig. 31), are highly recommended by Beverly Robinson, of New York. The growths gradually shrivel up, and are blown from the nose after a couple of weeks of treatment.

The method recommended by Donaldson, of Baltimore, is especially satisfactory when used for small polypi. It consists in the application of chromic acid to each growth by means of a pointed glass rod, the extremity of which is previously dipped into a solution or paste of chromic acid (100 grs.–℥j), and then forced into the polypus. The growths shrink through coagulation of the albumen forming the principal component of their mucin, and sometimes fall of their own accord.

I have found a fifty per cent. solution of carbolic acid, a few drops of which are forced into each tumor by means of an hypodermic syringe, very effective in cases in which the growths were very soft. Coagulation is induced and contraction follows, which sometimes culminates in spontaneous detachment from the base. When the polypi are numerous, not more than two should be treated at one sitting, lest inflammation be induced. When the growths do not become detached of their own accord, they are easily picked off with forceps.

Of the surgical means at our disposal, evulsion by means of forceps is probably the method most employed. The instrument shown in Fig. 43, can be employed for the purpose, its bend enabling the operator to guide its tip in the cavity without having his view obstructed by the handle. The great difficulty frequently met with, is the proper determination of the point of attachment of each polypus, so as to be able to grasp it between the blades of the instrument. The four per cent. solution of cocaine, however, is of great assistance here, and when applied freely to the surrounding membrane, causes contraction of its layers, generally exposing the base of the tumor, and increasing the working space. Besides, it limits markedly the hemorrhage, which is almost invariably present when the forceps are used. The growth being seized at its base, is then twisted on its axis and torn out. If cocaine is not used, a severe hemorrhage usually follows, which obscures the view of whatever other growth may be present. The usual practice is to renew the operation, notwithstanding the bleeding, until all the polypi have been extirpated, seizing what soft, non-resisting surface may present itself in the grasp of the forceps, and to tear it out. In this manner, the mucous membrane proper, and sometimes pieces of bone, are pulled out, while great pain is inflicted upon the patient. Although this method presents the advantage of rapidity, it is certainly a brutal and bloody one, and more calculated to inspire the patient with a desire to keep all future polypi which may recur, than to apply for relief. A much more satisfactory method, in my opinion, is evulsion by means of the snare, followed by the application of galvano-cautery or of some caustic acid to the site of the tumor. Straight snares, such as that shown in Fig. 38, are inconvenient for this purpose; the hand of the operator obstructs the view, and the milled nut does not cause sufficiently rapid traction on the wire. The instrument shown in Fig. 44 does not possess these disadvantages, and enables the operation to be performed rapidly and without pain.

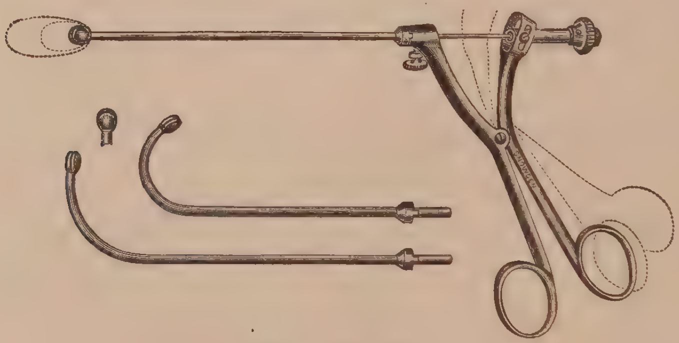
Fig. 43.



Polypus forceps.

It consists of a pair of ring handles, shaped and united like those in Tiemann's tonsillotome, the straight blade being furnished with a narrow cylinder and needle-rod such as that in my snare. The needle-rod being connected with the curved blade, it follows all the motions of the latter, when the rings are approximated or separated. The end of the cylindrical tube is furnished with a flattened, bulb-like enlargement, the edge of which is grooved. When the wire loop is connected with the needle in the manner described page 105, traction on the latter, by approximating the rings, will cause the wire to follow, and the end of the loop, instead of entering the tube and form a sharp bend, will rest in the grooved edge of the bulb, preserving its rounded form at the portion of the loop which would otherwise be the bending point. This arrangement not only prevents "kinking" of the wire, but renders it able to assume the loop shape by merely separating the rings. The loop can thus be contracted or enlarged at will. An important feature of this arrangement is that the instrument can be introduced into the nasal cavity with no loop to interfere with its proper location. Once *in situ*, the rings of the handle are separated, and the loop is enlarged as required, and being slipped over the growth until its point of attach-

Fig. 44.

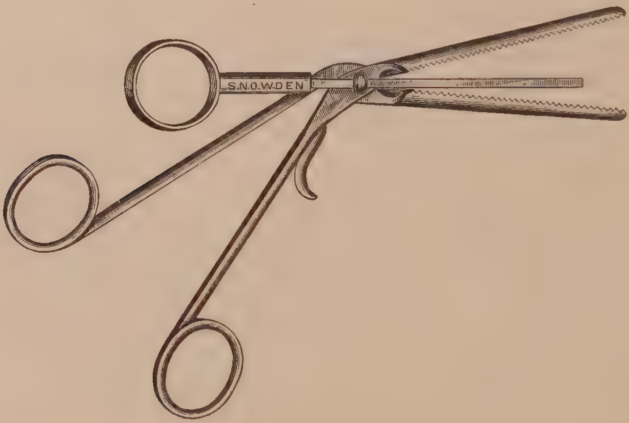


Author's polypus snare.

ment is reached, the tumor can either be torn off or cut off, this being easily done by reason of the powerful leverage the mechanism presents. For my part, I prefer the cutting operation. Hemorrhage almost always follows when a polypus is torn away, whereas such is not the case when the growth is severed close to the membrane. That thorough extirpation can only take place when the "roots" are pulled away is doubtful in the extreme, since polypi frequently break off some distance from the seat of implantation at the narrowest portion of the pedicle. By cutting the tumor off close to the membrane, no hemorrhage follows to obscure the view for the evulsion of the other polypi, and what portion of the tumor is left behind can be thoroughly destroyed by the application of galvano-cautery, chromic, or glacial acetic acid. For the two latter, a probe such as Harrison Allen's (Fig. 20) may be used. When a pedicle is easy of access, chromic acid fused at the end of the probe is the most effective agent, while parts difficult to reach are best treated with glacial acetic acid, which can be applied over much greater surface. In this case a probe is bent so that its tip will penetrate into the sinuosity in which the polypus grew; the instrument being then withdrawn and armed with a thin pledget of cotton, the latter is dipped in the acid, then applied thoroughly to the site of the tumor. With this treatment, I have seldom if ever, had recurrence on the same spot, while the result was far less favorable in extirpation by forceps.

The galvano-caustic snare may also be used, and is preferred to any method by some specialists. The procedure is the same as for the ablation of posterior hypertrophies (see Fig. 40), the wire loop being pushed up as near the attachment as possible. The soft consistence of the growth renders a much more rapid section possible. When the wire has been tightened around it by depressing the finger-lever. the mere act of closing the circuit is often sufficient to detach the polypus from its base. If this does not occur, another movement of the finger-lever will cause the glowing wire to penetrate the pedicle. An advantage of this procedure is, that if the tumor can be cut off flush of the membrane, the cauterization produces sufficient effect upon the latter to destroy all vestiges of the severed tumor; but the limited resiliency of platinum renders this procedure very difficult, the least resistance causing it to bend downward and remain bent. Steel wire, on the contrary, responds to the motions of the canula, and adapts itself closely to the surface on which the tumor is attached.

Fig. 45.



Morell Mackenzie's nasal bone-forceps.

In repeated recurrence of polypi, some authors advise the removal of a portion of the underlying turbinated bone. Having never performed this operation, I can only state that, according to these authors, the operation is not followed by evil results. Dr. Morell Mackenzie's punch forceps (Fig. 45), seems to me to be the most convenient instrument for the purpose. "It consists of deeply-grooved blades somewhat flattened from side to side, opening vertically and constituting a tube when closed. Each blade, in fact, is a half tube, and has, therefore, an inner and an outer edge. The inner edges of each blade (those which, when the instrument has been introduced, are nearest the septum), are slightly serrated to enable the operator to seize the turbinated bone securely. Within the tube formed by the closed blades, a third blade, beveled at its anterior extremity to a sharp edge, like a chisel, can be projected forward when the instrument is in position. The forceps is introduced with the chisel drawn back, and the tissue to be removed having been firmly grasped by the forceps, the cutting point is driven home with the author's free hand." Dr. Woakes' nasal plough (Fig. 41), it seems to me, would also be very useful for the same purpose.

When the polypus is situated very far back, or protrudes into the posterior nasal space, the instrument shown in Fig. 44, can be utilized, either through the anterior cavities, or posteriorly by means of the curved tube, which can be connected with the handles, instead of the straight one. In either operation, the tube is introduced with the wire loop drawn in, and when the extremity of the canula is in the desired position (which can be ascertained with the rhinoscope, or if the tumor is too large, with the finger passed behind the soft palate), the loop is allowed to expand, and passed over the tumor, using digital assistance if required. In moderately large polypi, the blades can be approximated rapidly and the growth severed in an instant; but when it is very large, the threaded screw and milled-nut arrangement, attached between the two levers, had better be used, to gradually snare the growth off. This is to avoid hemorrhage, should large vessels be present in the pedicle of the growth.

Electrolysis is another method occasionally employed to destroy mucous polypi. A zinc or silver needle, connected with the positive pole of a moderately powerful galvanic battery, is introduced into the tumor, while the other sponge electrode, thoroughly wetted, is applied over the nose. A tingling sensation is experienced during the operation, which is not followed by the least annoying symptom. When the polypi are small, a few sittings are generally sufficient to cause their destruction, but when large, several are required. Each sitting should occupy about fifteen minutes, and be renewed every three or four days.

FIBROMATA, OR FIBROUS POLYPI.

This variety of nasal polypus is much more formidable than that just described, and may present itself at any period of life. It rarely occurs primarily in the anterior nasal cavity, generally invading it from the posterior nasal or the accessory cavities. The roof seems to be its favorite site in the nose, although cases have been reported in which fibrous polypi sprang from the septum, the inferior turbinated bones, and even the floor. They grow much more rapidly than mucous polypi, regardless of surrounding parts.

Pathology.—Fibrous polypi arise from the periosteum, and occasionally from the bone proper. Their external envelope is the same as in the gelatinous variety, but their bulk is mainly composed of fibrous tissue with numerous cells and nuclei, freely supplied with blood-vessels. Both varieties of polypi may be represented in the one growth, *i.e.*, fibro-myxoma.

Symptoms.—Fibromata at first present the same symptoms as small gelatinous polypi, but as they grow, this similarity gradually decreases. When obstruction to nasal respiration begins, it is constant and gradually increases, while no influence is exerted by dampness, as in gelatinous polypi. When the entire lumen of the cavity has become occluded by the tumor, its growth still continues, to the detriment of bones. cartilages, etc., that may be in the way, causing absorption of the osseous walls, and penetrating into what fissures may be formed, and sometimes into the accessory cavities. When this stage is reached, the walls of the nose proper are frequently forced apart, and the face assumes the appearance termed "frog-face." Ulcerations over the surface of the growth give rise to a purulent discharge, and to frequent attacks of epistaxis. Fibrous polypi sometimes attain an enormous size, and give rise to frightful deformity of the face.

The appearance of a fibrous polypus differs greatly from that of the soft variety. The color is much like that of the surrounding membrane—perhaps somewhat darker-red. with a large vessel here and there. There is, of course, no translucency, and when pressed upon with the probe, it is firm and resistant. It is most frequently sessile. Its base, which can rarely be seen, is generally very broad.

Prognosis.—Left to itself, a fibroma is liable to degenerate into sarcoma. The growth gradually progresses until the patient's vital forces are exhausted by repeated hemorrhages, while his death may be caused by gradual septicæmia, through the constant swallowing of purulent discharges.

Treatment.—Radical extirpation by surgical means can alone be of benefit. When the growth is small, the cold wire snare, or better still, the galvano-caustic snare, may be employed to sever the tumor as close to its seat of implantation as possible. When the growth is pedunculated, this is easily accomplished, but great difficulty is encountered when it is sessile. Its location in the majority of cases renders the application of transfixing needles impossible, while less gentle means, such as tearing the growth off by pieces with forceps, is likely to be followed by dangerous hemorrhage. Again, when the tumor is situated in the upper part of the cavity, extirpation may be followed by fatal consequences, owing to the close proximity of the brain and its membranes. Electrolysis, described under the preceding heading, has produced very satisfactory results in the hands of Dr. Lincoln, of New York, who reduced some large tumors prior to their extirpation. This method, if used persistently in small sessile growths, may suffice to induce their obliteration.

When the tumor cannot be reached through the nares, an operation to render free access to the roof of the nose possible, becomes necessary. Among the methods employed, the following are the least formidable:—

Rouge's operation consists in dissecting the upper lip and the nose proper from their points of attachment on the superior maxillary bones, then doubling the detached portions upward on the forehead. The anterior nasal cavities are thus fully exposed, and the tumor is within easy reach. This operation possesses the advantage of producing no disfigurement.

Cassaignac's operation is to partially detach the nose from the face by severing its bony and soft connections above the bridge, on the one side, and below. The uncut side serves as a hinge, and the nose can be turned over on the cheek like the lid of a box.

Ollier's operation consists in detaching the nose from the face by incising the soft tissues and the bones on both sides from the root down to the edge of each ala, after which the nose can be turned down, its tip resting against the upper lip. (Full descriptions of these operations and a number of others will be found in works on general surgery.)

The anterior nasal cavities being fully exposed and the location of the growth ascertained, the galvanic snare, with the assistance of Jarvis' transfixing needles, is probably the most satisfactory method at our disposal. Hemorrhage is much less likely to occur than when the cold wire, the knife, or the forceps are used. The manipulation is the same as that described for anterior hypertrophies. The same may be said of tumors which can be treated through the anterior nares without preliminary operation.

Strangulation of the tumor by means of a ligature is another method, which can, of course, only be applied to pedunculated growths. The plan is objectionable through the repulsive odor to which the sloughing mass gives rise, and the danger of septicæmia.

PAPILLOMATA.

Papillomata are wart-like growths occasionally found in the nasal cavities of young subjects. They are most frequently attached to the septum, and to the inferior turbinated body. They vary in size from that of a lentil to that of a small chestnut, and present a light brownish color, with an irregularly corrugated surface.

Pathology.—Papillomata are mainly composed of connective tissue arranged in papillary processes on the surface, into which capillary vessels are freely distributed.

Symptoms.—In children, papillomata cause considerable irritation in the nose, a catarrhal condition being maintained, and the discharge causing excoriation of the upper lip and the edge of the nostril. Cough may be induced by the reflex irritation occasioned by their presence. Sneezing is also a marked symptom when the growth is sufficiently large to touch the septum, its size also causing obstruction to nasal respiration.

Treatment.—When the growths are small, a couple of applications of nitric acid are usually sufficient to destroy them. This may be applied with Allen's probe (Fig. 20) armed with a small pledget of cotton. When they are larger, the polypus snare, or the ordinary wire écraseur (Fig 38), can be used, after which the point of implantation can be touched with chromic or glacial acetic acid to prevent recurrence.

CYSTS.

Cystic growths are occasionally met with in the nasal cavities. They are grayish, more or less rounded and smooth, and are generally found in the posterior nares. Their resemblance to mucous polypi is very great, their differentiation being difficult.

Cysts originate in the mucous membrane, and contain a clear, colorless, viscid fluid, which escapes when the investing sac is accidently ruptured.

Treatment.—Evulsion by means of the snare is doubtless the best and the simplest procedure. Removal of these growths is not followed by recurrence.

ECCHONDROMATA.

Ecchondromata or cartilaginous tumors are not infrequently met with in the anterior nasal cavities. They almost always spring from the septum, the exceptions springing from the frontal and ethmoidal cells and from the floor of the nose. The septal tumors, which are frequently associated with deviations of the septum, grow very slowly until they have attained a certain size, when their growth ceases. The tumor, which is really but a local overgrowth, then causes more or less trouble, according to its dimension. Situated in other portions of the nasal cavities, ecchondromata assume great importance, behaving much like fibrous polypi, although their progress is less rapid. Their attachment is by a broad base. On the septum, they are usually cone-shaped, while in the other portions of the nose, their form is spherical.

Pathology.—Ecchondromata, when originating from cartilage, grow from the deeper layers of the perichondrium. Those which arise from bone start from the medulla and tend to cause absorption of the underlying osseous tissue. The latter occasionally assume a sarcomatous character, and grow much more rapidly than the former.

Symptoms.—In septal ecchondromata, nasal obstruction, proportionate with the size of the growth, may be the first cause of complaint. If the tumor is large enough to touch the other side of the cavity, erosion of its surface takes place, and a sanious, irritating discharge may be present. Pain, occasioned by pressure against the opposite surfaces, may also be induced, while headache, sneezing, impaired intonation of the voice, anosmia, etc., are of occasional occurrence. These symptoms usually continue without aggravation in septal ecchondromata, but when the tumor is located in other parts of the cavity, and is of a semi-malignant or sarcomatous type, its rapid growth causes the same symptoms as fibrous polypi, displacement of neighboring portions of the nasal walls, deformity of the nose, etc. Such tumors tend to recur after removal.

To the eye, septal tumors do not differ greatly in color from the surrounding membrane. Their broad base serves to distinguish them from polypi, which are extremely rare on the septum, while they can be differentiated from osseous tumors by the introduction of a fine needle, which the former would not admit of. In the other portions of the nasal cavity, their hardness, their spherical form, and their regularity of surface are characteristic.

Treatment.—Septal ecchondromata being in the great majority of cases located just within the nostril, they can be readily removed. They may be shaved off with a sharp, probe-pointed bistoury, or transfixed with a needle and detached by means of the cold wire or the galvano-caustic snare. The same methods are applicable to ecchondromata occurring in the other portions of the cavity, below the olfactory region.

The tendency of ecchondromata originating from bone to cause absorption of the osseous tissue underlying them, becomes an important consideration when surgical measures are to be adopted, especially when the neoplasm is located in the upper part of the cavity near the brain. Operative procedures are, therefore, hazardous when the tumor is situated in those regions, especially if it is of large size. Should an operation be deemed advisable, however, the means recommended for fibrous polypi may be employed.

OSTEOMA.

This name is applied to a rather rare form of osseous tumor, which, growing from the mucous membrane, independently of the bony framework of the nose, is generally met with in young subjects. In some cases, its starting point is in the accessory cavities.

Pathology.—Osteomata are the result of the ossification of newly-formed connective tissue. They may be of great hardness, in which case they consist of densely crowded osseous lamellæ, or comparatively soft, cancellous bone preponderating in their internal construction.

Symptoms.—Pain usually accompanies the presence of these tumors, through the pressure they exert. Headache is frequently present, and epistaxis is an occasional symptom. They are pedunculated in most cases, hard to the touch, and are either the color of the surrounding mucous membrane or somewhat darker, their surface being irregular in outline.

Where they are sufficiently large to touch the opposite surface, they become eroded and give rise to a muco-purulent discharge. Their hardness is characteristic. A needle, which will penetrate any other kind of growth, will not penetrate an osteoma.

Treatment.—When the growth is not very large, it can generally be broken off with the polypus forceps. If its pedicle is too thick to allow this, the little saw shown in Fig. 46 will soon separate it from its point of attachment. Occasionally, the portion connecting it with the mucous membrane is so soft that it can be easily cut with scissors. When deep-seated in the nasal cavity, the snare can be used as for posterior hypertrophies.

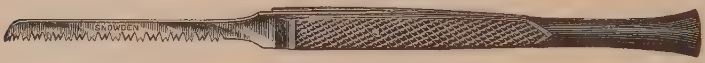
EXOSTOSES.

Exostoses are bony growths frequently met with, which usually spring from the septum. When located anteriorly they are situated at the junction of the latter with the floor of the nasal cavity, presenting the appearance of a spur or pointed crest. When in the middle or posterior portions of the septum, they generally assume the shape of a longitudinal shelf with a broad base. Their growth is very slow, and is arrested, in the majority of cases, when a certain size has been attained Occasionally, their crest seems to bury itself in the opposite surface, generally the upper portion of the inferior turbinated body, thus forming a bridge across the cavity.

Pathology.—Exostoses spring from the periosteum, and are almost always composed of lamellæ of ivory hardness, arranged concentrically. Cancellous tissue is generally absent in anterior exostoses, but is frequently present at the base of middle and posterior growths.

Symptoms.—In the majority of cases, exostoses give rise to no inconvenience. Occasionally, their growth is not arrested before the other side of the cavity is reached, and a series of symptoms occur much like those due to the presence of a foreign body. The membrane, first irritated, then compressed by the apex of the growth, undergoes an inflammatory process with profuse secretion, which nothing short of surgical procedures can arrest. Pain, due to pressure, is sometimes quite severe, and manifests itself in the course of the fifth pair, while reflex asthma, due to pressure upon the posterior portion of the inferior turbinated body, may be induced, as was the case in one of my patients. The obstruction to nasal respiration is hardly ever sufficient to be noticed. Deflection of the nose is sometimes caused by the lateral pressure occasioned when the exostosis is sufficiently large to rest against the opposite side of the nostril.

Fig. 46.



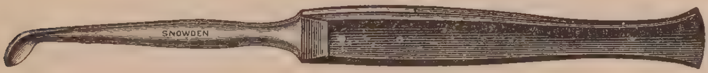
Author's exostosis saw.

Upon inspecting the nasal cavity, a growth situated in its anterior portion can be readily seen. Hardness, a broad base, and a light pink color are characteristics, while its immovability upon its seat of implantation serves to differentiate it from an osteoma. It bleeds readily when touched. Situated deeper in the nasal channel, its physical properties cannot be as readily ascertained, but the probe will be found of advantage to discern its conformation.

Treatment.—When exostoses give rise to active symptoms, the only effective procedure is to remove them. This can be accomplished by a number of methods, among which the simplest, perhaps, is by means of the fine saw represented in Fig. 46, the teeth of which are so disposed as to cut rapidly and evenly through the bony tissue.

When the growth is large, the periosteum and the mucous membrane should be detached from the base of the tumor by means of the knife shown in Fig. 47, the upper curved portion of which is blunt on top and very sharp below. An elliptical incision being quickly made around the growth, the blunt edge is passed between the periosteum and the bone, and the former is raised. The saw being then passed into the cut, its elasticity will allow it to bend when used, and a cup-shaped surface will remain, over which the periosteum and the membrane will readily adjust themselves. Performed in this manner, the operation will be followed by no annoying after-effects. When the exostosis is deep-seated in the cavity, the saw alone can be used, and the growth detached as close as possible to the septum. The surgical engine is occasionally more satisfactory for the removal of these growths. A small drill or burr, revolved sufficiently fast, cuts effectively into the osseous tissue without affecting the soft membrane. A small incision being made in the latter, the burr is introduced through it and the redundant portion of bone drilled off, under the membrane. The case alluded to above was treated in this manner, the entire thickness of the posterior portion of the vomer being reduced from an abnormal local thickness of one-third inch to that of one-eighth inch. The most satisfactory instrument, in my opinion, is that of Dr. Bonwill (Fig. 48), which combines speed and great delicacy of motion.

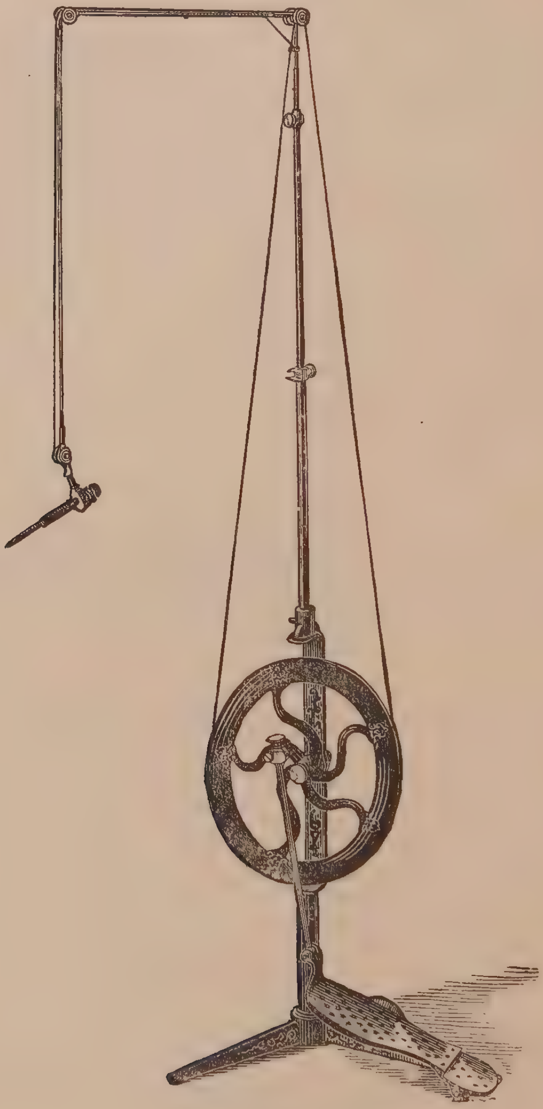
Fig. 47.



Author's periosteal knife.

In bridge-like exostoses extending from the septum to either wall of the cavity, the surgical engine is by far the most efficient instrument for their removal. A burr with a diameter corresponding with that of the cavity, is rested upon the surface of the growth, and pressure is exerted upon it as

Fig. 48.

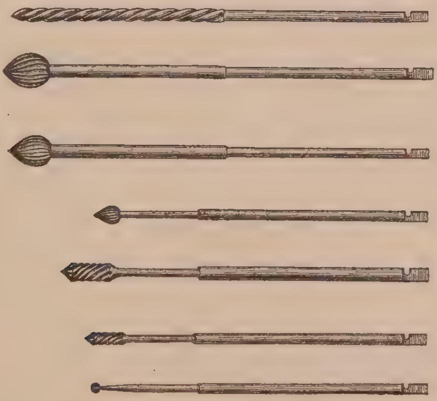


Bonwill's surgical engine.

it revolves. The sharp instrument soon cuts its way through the growth, shaving it off the septum.

These operations are usually accompanied with much hemorrhage, and must therefore be done rapidly. The pain induced is remarkably slight, no general anæsthetic being required. This is especially true if a four per cent. solution of cocaine is used. It not only prevents what little pain would otherwise be caused, but also limits bleeding. The parts heal kindly, without giving rise to systemic disturbances.

Fig. 49.



Burrs for surgical engine.

SARCOMA.

Sarcoma may occur primarily in the nasal cavities. In a large proportion of the cases, its starting point is the septum or the outer wall of the cavity, soon extending to the neighboring parts. Mucous and fibrous polypi and ecchondromata, as already stated, occasionally degenerate into sarcomata.

Pathology.—The pathological characters of sarcoma in the nasal cavity are the same as those presented when the neoplasm is situated in other parts of the economy. It originates from connective tissue, which preserves its embryonic type. The cells which form the bulk of the growth are principally the round, fusiform, or myeloid, all of which may be present together, although one form usually predominates to a marked degree.

Symptoms.—The first manifestation of the affection is obstruction to nasal breathing. A fetid, greenish and sometimes bloody discharge, due to superficial ulceration, soon sets in, and pain, due to the expansion of the surrounding parts, follows. The conformation of the latter being altered, the features may become deformed if the tumor grows anteriorly, or great headache, deafness, dysphagia, etc., may occur if the growth is in the posterior portion of the nasal tract. If located near the roof, destruction of the bones forming it may take place, causing death by extension to the brain.

Sarcomata usually present a red, fleshy appearance, assuming at times a violet hue. They bleed easily when touched, and communicate a doughy sensation when a probe is applied to them. They are generally single and sessile.

Prognosis.—The rapidity with which sarcomata usually grow in children makes an early end in them quite probable. In adults, their growth is much slower and the chances of an early and complete evulsion are thereby increased.

Treatment.—Thorough extirpation of the growth is the only recourse, when the patient is seen sufficiently early to render this possible. Imperfectly done, this procedure will be followed by recurrence, with marked increase of malignancy and rapidity of growth. Much comfort may be given the patient by means of detergent and anodyne sprays. Morphia, and belladonna, either of which may be added to a borax solution, or a five per cent. solution of cocaine, are the most effective agents.

PLATE IV.

PLATE IV.

Figure 1.—Male, æt. 38; hypertrophy of entire mucous membrane of nasal cavities; relieved by means of bougies and galvano-cautery. Case referred by Dr. T. G. Morton.

Figure 3.—Rhinoscopic view of above (normal size).

Figure 5.—Female, æt. 26; appearance of nasal cavity after loss of septum and turbinated bones, and enlargement of the orifice of the antrum through syphilitic necrosis. Mercurials and iodides; extraction of necrosed bones with forceps. Pot. permang. washes.

Figure 7.—Rhinoscopic view of above with mirror facing obliquely from left to right (normal size).

Figure 9.—Female, æt. 19; mucous polypi; removed with snare, subsequent galvanic cauterizations.

Figure 11.—Anterior view of above (normal size).

Figure 13.—Female, æt. 30; large fibrous polypus of laryngeal vault; removed with galvanic snare. Dr. Louis Jurist's case.

Figure 2.—Male, æt. 30; syphilitic perforation and exostosis of septum; mercurial treatment, and mitigated stick locally. Case referred by Dr. L. Webster Fox.

Figure 4.—Rhinoscopic view showing exostosis of septum in the above (normal size).

Figure 6.—Female, æt. 17; syphilitic perforation of hard and soft palate; mercurials and iodides; mitigated stick locally.

Figure 8.—View of palate through the mouth (in state of active inflammation).

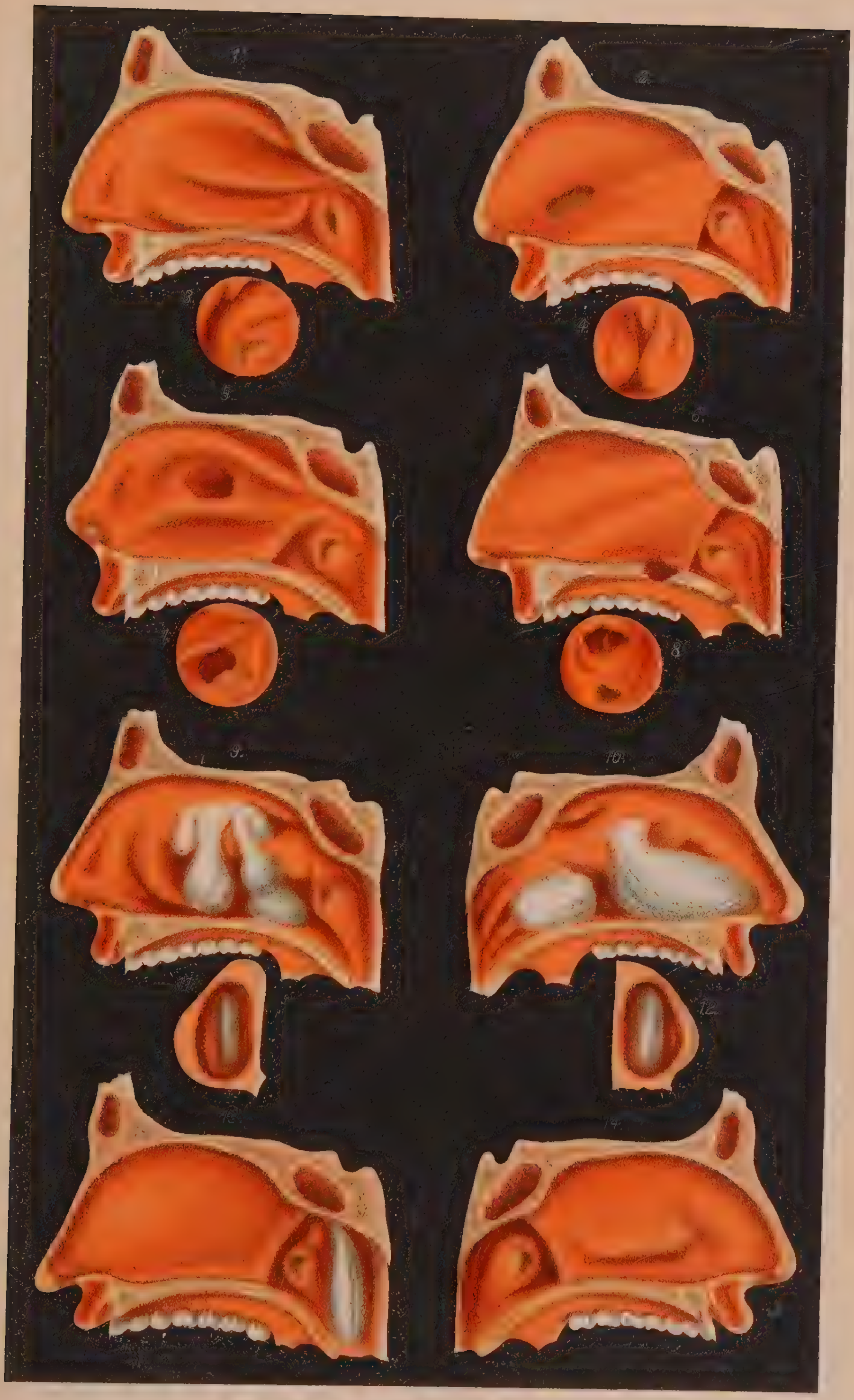
Figure 10.—Female, æt. 45; large mucous polypi; removed with snare; subsequent galvanic cauterizations.

Figure 12.—Anterior view of above (normal size).

Figure 14.—Male, æt. 28; central curvature and exostosis of septum; longitudinal incision with knife; oakum plugs; exostosis removed with saw. Case referred by Dr. William S. Little.

[Note.—Represented as seen by gas-light. By day-light, the red color appears much paler.]

Plate IV.



E Sajous, Pinxit.

Burk & M^c Fetridge, Lith. Phila

CARCINOMA.

True cancer of the nasal cavities is of rare occurrence. In the majority of cases it presents itself in children, and is either of the encephaloid or epitheliomatous type. Scirrhus occasionally occurs in subjects beyond middle age. It frequently invades the nasal cavities from the surrounding parts.

Pathology.—As is the case with sarcoma, carcinoma presents the same pathological characters in the nose as in other parts of the system. They vary, of course, according to the variety of cancer present.

Symptoms.—A soft, inflamed pimple is generally the form first assumed by the growth. This rapidly increases in size and finally opens, a thin, brownish liquid escaping. Severe pain and epistaxis are almost always present. A deep, ragged ulcer forms at the opening, which spreads to all the neighboring parts, the thickness of the growth increasing at the same time. The cervical glands become enlarged, and constitutional infection, followed by extreme exhaustion, soon causes death.

Prognosis.—Recovery is as hopeless as when carcinoma occurs in any other part of the body.

Treatment.—Operations merely advance the fatal issue, unless undertaken at the very start. Palliatives, nutrients, and cleanliness constitute the indications, to which may be added the application of mild astringents, which are said to retard growth.

CHAPTER IX.

DISEASES OF THE ANTERIOR NASAL CAVITIES.—*(Continued.)*

DISEASES OF THE SEPTUM.

The septum being implicated in almost all the affections so far described, the majority of the diseases to which it is liable have already been alluded to. This chapter will therefore be devoted to the consideration of abnormal conditions which may affect it independently of the surrounding parts.

DEVIATION OF THE SEPTUM.

The term "deviation of the septum," as here understood, means a lateral curvature of the septum, which may be perpendicular or horizontal, localized or general, or a dislocation of its framework from the middle line, sufficiently marked to interfere with the functions of the anterior nasal cavities.

Etiology.—Few, if any, subjects may be found in whom the septum nasi presents a perfect perpendicular plane. It generally bends or curves toward one side or the other, enlarging one nasal chamber at the expense of the other. This irregular conformation is ascribed to many causes: Inordinate growth of the septum as compared to that of the bony framework of the nasal cavity; traumatism, such as blows, falls, etc., by which it is either broken or forcibly bent to one side; great height of the palatine vault, through which the floor of the nose and its roof are in closer proximity than normal, the septum (the growth of which continues notwithstanding) being bent to one side by the resistance of its unyielding points of attachment (Jarvis). The pressure exerted upon the nose in the act of blowing is also considered as a cause by Béclard. Deviation of the septum is more frequently observed in males than in females, the greater degree of exposure to which the former are liable being probably accountable for the difference. Bryson Delavan advanced the opinion that hypertrophy of the middle turbinated bone can act as a cause of deviation, basing his opinion on the fact that in eighteen crania in which it existed, sixty per cent. presented hypertrophy of the turbinated bone facing the concave side of the septum. I am more disposed to consider such an hypertrophy as an effort of nature to restore as much as possible the normal distance between the sides of the cavity, to enable it to perform its physiological functions.

Pathology.—The deviation may involve the entire septum or be limited to its cartilaginous portion, the perpendicular plate of the ethmoid, or the vomer, but in the majority of cases, the cartilage alone is affected. The bend may be angular or rounded. In the former case, a wedge-shaped prominence, which may be oblique, perpendicular, or horizontal in its longitudinal axis, is formed, a more or less deep sulcus or sharply defined depression existing on the opposite side of the septum. In the latter, the prominence is smooth and globular, presenting a much greater degree of obstruction to the cavity and showing a corresponding depression on the other side. Angular curvatures generally exhibit hypertrophic changes at the apex of the prominence. At the junction of the cartilage with the perpendicular plate of the ethmoid, a simulated deflection which, according to Harrison Allen, is due to hyperostosis of the sutural line, is frequently found. In these cases, but little, if any, depression exists on the other side of the septum. The deviations are sometimes double, the convexity of one bend presenting in front on the one side, and the convexity of the other bend presenting further back on the other side, thus forming a double deviation resembling in shape the letter S. In cases of fracture, the cartilage is the portion of the septum most frequently broken. Next in order comes the perpendicular plate of the ethmoid, its articulation with the vomer being the usual seat of fracture. The vomer is very rarely influenced by the concussion, its anterior edge being posterior to the bones of the face, and the cartilage yielding to the force of the blow.

Symptoms.—When the septum is considerably deviated, there is usually some deformity of the nose; the tip may be turned to one side or the other, or the organ may appear depressed just below the nasal bones, or assume a variety of other shapes. The degree of obstruction to respiration is of course in proportion to the degree of the deflection, complete occlusion sometimes taking place. At times the complete obstruction is due to the atmospheric pressure which causes the alæ during inhalation to adapt themselves against the lower edge of the septum on each side. A nasopharyngeal catarrh is almost always present, due principally to the interference with the flow of the secretions anteriorly, causing them to accumulate behind the prominence and flow backward over the sides of the soft palate, down along the pharynx, and then be swallowed or expectorated. The cavity opposite to that of the prominence is sometimes the seat of chronic inflammation also, its patency rendering its proper cleansing difficult. In most cases, however, there is compensatory hypertrophy of the portion of the turbinated body lying opposite the concavity of the septum, and the functions are carried on normally on that side. Anosmia is a frequent symptom. The voice occasionally acquires a nasal intonation, especially marked in antero-posterior sigmoid deflection, when both cavities are partially or completely closed. When the prominence presses against the opposite turbinated body, erosion of the latter may take place, which gives rise to frequent attacks of epistaxis. Atrophy may be induced through the pressure exerted. Catarrhal deafness is an occasional result. The convex portion of a deviated septum may be confounded with a polypus; but its hardness, and its color, coupled with the corresponding depression on the other side of the septum, will soon establish the correct diagnosis. The varieties of deviation are so numerous that the judgment of the physician is greatly taxed in each case when the choice of a procedure is to be made.

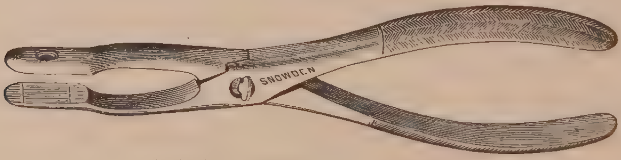
Treatment.—Among the remedial measures proposed, that of Michel is perhaps the simplest. The patient is directed to press with the finger upon the convex portion of the deviation several times daily. After a time, a slight deflection can be reduced and the septum returned to its normal shape. In the great majority of cases which apply for treatment, however, the deviation is too marked to be influenced by anything but surgical means. The least difficult operation, and one which has always given me great satisfaction, in simple cartilaginous deflection, is an incision through the protuberance, following its long axis. A smart hemorrhage occurs as soon as the incision is made, but it soon ceases. The end of the finger being introduced into the nostril, the septum is forcibly pushed beyond the centre and maintained there by packing the previously obstructed nostril with carbolized oakum. The cut edges of the cartilage override each other, and, after a couple of weeks, are firmly united. The oakum plugs should be changed daily and both cavities sprayed with a solution of permanganate of potash (gr. j–℥j).

A method recommended by Dr. Fletcher Ingals, of Chicago, in anterior cartilaginous deviations, is to make an oblique incision through the membrane of the convex portion of the prominence. He then detaches the membrane a certain distance on each side of the cut, from the underlying cartilage, exposing the latter. A triangular piece is then cut out, the base of the triangle being at the floor of the nose. Care should be taken to detach the cut piece from the lining membrane of the other cavity, without tearing or cutting through it. The first incision is then closed by stitches and the cartilage is pressed into line and supported by means of tampons.

Dr. John B. Roberts, of Philadelphia, makes a long incision, oblique or horizontal, according to requirements, through the septum from back to front along the line of deviation or projection. This is done with a knife introduced into the occluded nasal chamber. If the bony septum is deviated, it is divided by a chisel in the same way and direction. He then introduces a long steel pin into the normal nostril, and passes its point, with about two-thirds of its length, through the septal cartilage, a short distance above and in front of the incision. This brings the point of the pin into the occluded nostril. Pressing the end of the nose and septum, according to the character of the case, into proper position, he brings the "head-end" of the pin close to the anterior part of the septum or columella, thus causing the "point-end," or portion in the occluded chamber, to lie across the incision and adapt itself lengthwise along the surface of the septum beyond the incision. The pin is then pushed in up to the head, and its point is thus deeply imbedded in the soft tissues of the septum and upper and posterior part of the occluded chamber. It may be said that theoretically, the point is by this movement passed through the cartilage of the septum, so that it re-enters the nasal chamber by which it was originally introduced, namely, the normal one, and that the head and point are on the same side with the severed septum, held straight by the rigid pin. Practically, however, the point never comes through the partition, but is deeply buried somewhere in the neighborhood of the superior or middle meatus of the obstructed side in the septal or perhaps in the turbinated wall of that side. It makes little difference where the point is fastened so that it is firmly fixed and holds the incised septum straight. Often, two pins will be needed to correct this deformity. In such cases, Dr. Roberts usually inserts the second one, not from the mucous surface within the nostril, but from the cutaneous surface of the dorsum of the nose just below the nasal bone, having previously, if necessary, forced the cartilage loose with a tenotome. The operation is necessarily a bloody one, because of the vascularity of the parts and because the operation will be *useless* unless the incision or incisions are very free, so as to take away all resiliency of the cartilage. If the deflection of the septum is a general rather than an abrupt one, he weakens the septum, after the primary incision, by multiple incisions with the stellate punch, which should make large cuts, completely through the cartilage. The pins are then introduced as before. Any spur of cartilage or bone along the floor still prominent is cut away with the knife or saw. Dr. Roberts says that it is sometimes wise to thread a small disk of rubber upon the pin before inserting the point, as carpet tacks are sometimes given a leather collar, below the socket when the pin has been thrust entirely in; the rubber will prevent its head from ulcerating through the tissues and thus losing its power of holding the parts in proper position until union occurs. The pins are left in position two weeks. This method possesses the advantage of simplicity and effectiveness. The patient is subject to but little inconvenience, and the cavities can resume their functions at once, and no disfiguring apparatus is apparent. A small square of court plaster will cover the end of the external pin, which should have a flat head. The other does not show, for its head lies within the nostril.

Another method of dealing with deviation of the septum is to forcibly return it to its normal position by means of forceps, as suggested by Adams, of London, who used an instrument similar in shape to that shown in Fig. 50, and which served as a model for the latter's general conformation. The blades being introduced separately and united, like obstetric forceps, the septum is grasped firmly and moved back to the median line, breaking it if necessary. After being maintained in position by means of a clasp for a few days, ivory plugs are introduced and left *in situ* until the cartilage has become firm. Too great pressure must carefully be avoided, while frequent cleansing should be practised. After a time the ivory plugs may be replaced by wadding or oakum ones.

Fig. 50.

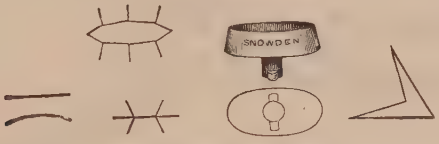


Author's modification of Adams' punch.

Blandin, of Paris, overcame the unilateral obstruction to respiration by perforating the septum by means of a punch, a round or oval hole about one-quarter inch in diameter being made. A disagreeable feature of this operation is that the margin of the opening is continually covered with crusts, which excoriate the underlying membrane and keep it in an irritated and sometimes ulcerated condition. Steele, of St. Louis, uses a punch with diverging blades (see Fig. 51), which serves to render the septum flexible prior to straightening with forceps such as Adams'. The subsequent treatment is the same as in the latter surgeon's operation.

The modification of Adams' forceps, shown in Fig. 50, enables the operator to perform the different operations in which such an instrument is required, without rendering necessary the possession of a special forceps for each variety. The punches being adjustable in a perforation near the extremity of one of the blades, any shape of punch may be used with the one forceps. Fig. 51 represents a set containing an oval Blandin and a Steele punch, an elliptical punch with diverging blades to cut off sharp bends of cartilage and reduce its elasticity prior to straightening, and two small blades—one curved and one straight—with which any shape of figure or cut can be made in the septum. The arrowhead-shaped punch serves very effectively for redundant deviations. A piece of that shape being punched out with the arrow point turned towards the tip of the nose, the punch-knife is detached from the forceps, and the latter are then used to bring down the sharp end of cartilage into the retiring angle of the cut, where it is kept in position by means of carbolized oakum plugs. When the deviation is great, the straight blade can be used to lengthen the lower line.

Fig. 51.

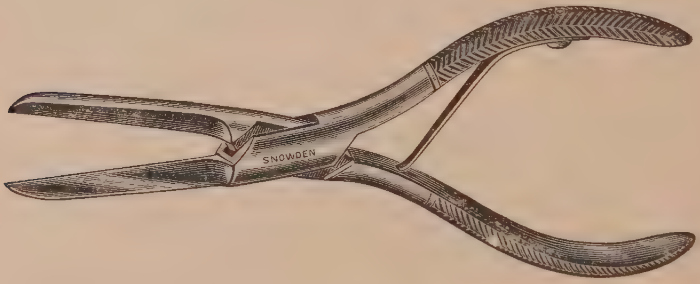


Set of punches and blades.

The after-treatment of these cases bears great influence upon the result. Hard plugs, such as those made of ivory, wood, etc., are, in my opinion, not recommendable. The pressure they exert interferes with the nutrition of the seat of operation, and occasionally gives rise to sloughing. Plugs of oakum are much more cleanly and exert sufficient pressure to hold the parts in the required position. They should be changed at least once daily.

In angular deviations complicated with hypertrophy of the tip of the prominence, a bone forceps, such as that shown in Fig. 52, is sometimes very convenient. The edges of the blades being placed behind the nodular extremity of the bony edge formed, a firm grasp of the handles will cause the growth to be quickly penetrated, with but little hemorrhage.

Fig. 52.



Nasal bone forceps.

Cocaine applied before any of these operations not only prevents pain but limits the bleeding and hastens resolution of the cut surfaces.

HÆMATOMA OF THE SEPTUM.

As a result of direct injury, an extravasation of blood may take place between the framework of the septum and its mucous lining. A bulging tumor of a purplish-red color is formed, giving rise to more or less obstruction of one or both cavities. Sometimes the blood is absorbed and resolution takes place, but at other times, inflammation occurs and an abscess results. The history of the case, the fluctuation of the tumor, and its general appearance, make the diagnosis easy.

A small extravasation generally disappears of its own accord. When it is large and gives rise to marked obstruction, some of the blood may be withdrawn with a large hypodermic syringe, which will relieve the tension and advance resolution. When inflammation presents itself, the growth had best be depleted by free incisions.

ABSCESS OF THE SEPTUM.

An abscess may follow an extravasation of blood or present itself after a traumatism, as a result of the local inflammation. It may be of short duration or last a considerable time, especially when it is due to necrosis of the underlying cartilage. The tumor, which is generally bilateral, is usually soft and yielding, and painful when touched near the base. Perforation of the cartilaginous septum occurs in the majority of cases, especially if the abscess is not evacuated early. Free incision into the growth, evacuating carefully the pus, will soon bring on resolution.

Abscess of the septum occasionally occurs as a result of syphilis, preceding perforation and perhaps destruction of the cartilaginous portion. In these cases, deformity of the nose may occur, a subject already alluded to under the heading of syphilitic rhinitis.

SUBMUCOUS INFILTRATION OF THE SEPTUM.

This condition is a comparatively frequent accompaniment of chronic rhinitis, as shown by Cohen. It consists of an œdematous tumefaction situated on each side of the septum, generally near its posterior border, contrasting by its whitish color with the surrounding membrane.

The masses may be torn off with forceps passed behind the soft palate, or cauterized by means of galvano-cautery or acids. The operation should be conducted with the aid of the rhinoscope.

CHAPTER X.

DISEASES OF THE ANTERIOR NASAL CAVITIES.—(*Continued.*)

NEUROSES.

PERIODICAL HYPERÆSTHETIC RHINITIS.

(Synonyms:—Hay Fever; Hay Asthma; Rose Cold; Summer Catarrh; Autumnal Catarrh; June Cold; Peach Cold; Rag-weed Fever; Catarrhus Æstivus; Idiosyncratic Coryza; Coryza Vasomotoria Periodica; Pruritic Rhinitis, etc.)

HYPERÆSTHETIC RHINITIS may be defined to be an affection characterized by periodical attacks of acute rhinitis, complicated sometimes with asthma, occurring as a result of a special susceptibility on the part of certain individuals to become influenced by certain substances, owing to a deranged state of the nerve-centres. It manifests itself only provided the mucous membrane primarily affected in the course of an attack is in a state of hyperæsthesia, and when the irritating substances are present in the atmosphere.

Etiology.—Since 1819, when Bostock first described the affection, of which he was himself a sufferer, numerous theories have been advanced to explain the peculiar periodicity of the affection and its cause. As early as 1839, Elliotson pointed to pollen as the probable cause of the affection, while twenty years later, Abbott Smith, Pirrie, and Moore, ascribed its active cause to the emanations of plants. In 1869, Helmholtz suggested that the disease was due to the presence of vibrios in the nasal cavities, which remained dormant in the winter months, and became active through the effect of the summer heat. Twelve years ago, Blackley of Manchester, reiterated Elliotson's opinion, that the affection was caused by the pollen of flowers and grasses, and demonstrated by a series of experiments the power of these substances to bring on an attack. In 1876, Beard, of New York, published a monograph, in which he showed that a large number of the sufferers were of a nervous temperament, and that the exciting agents were very numerous, and not limited to the pollen of flowers and plants, as was formerly thought. In 1882, Daly, of Pittsburgh, published a paper, in which he attributed the annually recurring attacks "to local chronic disease, upon which the exciting cause acts with effect," adding that "the parts should be put in order, and thereby enable them to withstand the exciting influence of the next recurring crop of bacteria." In 1883, Roe, of Rochester, N. Y., advocated the same theory, and stated "that hyperæsthesia is associated with, or occasioned by, a diseased condition, either latent or active, of the naso-pharyngeal mucous membrane," and "that the removal of the diseased tissue in the nasal passages removes the susceptibility of the individual to future attacks of hay fever." Later in the same year, I published an essay, in which I advanced "that hay fever was due to an idiosyncrasy on the part of certain individuals to become affected by certain emanations," that "organic alteration of the surface of the nasal mucous membrane altered its sensibility, and destroyed what morbid irritability might have attended the nervous filaments distributed over it," and, furthermore, "that hypertrophies of the nasal membrane increased its irritability, and the intensity of the symptoms." In January, 1884, Harrison Allen, of Philadelphia, in an article on the treatment of hay fever, attributed the disease to permanent or temporary obstruction of one or both chambers, and advanced the opinion that by overcoming this obstruction by the usual methods, a cure could be effected. In June of the same year, J. N. Mackenzie, of Baltimore, suggested the term "Coryza vaso-motoria periodica," on the ground that "the disease is essentially a coryza, showing in most cases a decided tendency to periodic recurrence, and dependent upon some functional derangement of the nerve-centres as its predisposing cause," and stated that "for the production of a paroxysm, a certain excitability of the nasal cavernous tissue is necessary (brought on by a multitude of external irritating causes), plus a hyperæsthetic state of (probably) the vaso-motor centres."

As advocated by myself in my paper of December, 1883, three conditions are essential factors in the production of an access of hay fever: Firstly, *an external irritant;* secondly, *a predisposition on the part of the system to become influenced by this irritant;* and thirdly, *a vulnerable or sensitive area through which the system becomes influenced by the irritant.*

As to the first condition, the elaborate and persevering researches of Blackley and the observations of Beard on the subject, demonstrate conclusively to my mind the power of certain substances to produce an access in individuals susceptible to their influence. Blackley caused, by applying to the mucous membrane of certain individuals, less than $\frac{1}{200}$th of a grain of the substance to which they were sensitive, all the symptoms which presented themselves during the course of an ordinary attack, while in his own person the simple inhalation of pollen produced all the characteristic symptoms. Cases are frequently met with, in which the mere approach of certain substances are sufficient to bring on a paroxysm even out of the usual time, while the removal of the subject from the irritating agent in the midst of the yearly period, and while an access is present, will cause the latter to cease. Again, as demonstrated by Dr. Blackley, the attacks can be greatly modified, if not prevented, by placing in the nostrils some contrivance which will purify the inhaled air of its irritating substances, showing plainly the power of the latter to induce a paroxysm.

Another evidence that pollen is a factor in the etiology of the affection, is the regularity with which the majority of plants undergo the different phases of their growth, each recurring the same day every year, and in some the same hour. This not only explains the periodicity of the accesses, but the precision with which most sufferers can prophesy the onset of their attacks.

The mere irritating property of a substance is evidently not the only factor in the production of the attack. This is exemplified by the fact that one subject may be affected by a certain substance which will in another be absolutely harmless. A gentleman under my care, for instance, although a great sufferer yearly almost since birth, can take rag-weed between his hands, crush it and inhale its emanations without experiencing the least ill-effect; and yet this plant is recognized as one of the greatest enemies of hay fever sufferers. In another case, the pollen of roses alone produces the manifestations and all others are absolutely ineffective. Subjects are seldom found, however, in whom a single agent will give rise to an access, the majority being influenced by several substances, with one in particular as the most active. Among the substances which are considered as causes of the affection, are dust, the pollen of plants in general, grasses and cereals, the emanations of certain flowers and perfumes, fruit, animals, sulphur, smoke, cinders, etc., while a small proportion of the sufferers ascribe the origin of their paroxysms to summer heat, sunlight, exposure to draughts of air, etc.

Dust, as observed by Beard, is the most common irritant, a fact which apparently weakens the pollen theory, but which in reality strengthens it. If we consider that pollen, like any other substance, is subject to the laws of gravitation, and that its very light weight is a provision of nature to insure its far as well as near dissemination, and its final fall to the ground; and that immense quantities of it are wafted through the atmosphere, subject to the mechanical displacement of its currents,—we can understand that the dust of the earth is but a part of what is generally considered as dust, the principal of its other constituents being an agglomeration of the pollen of all the plants in the surrounding country, and sometimes of those of distant districts, as well as all ponderable agents capable of acting as irritants. It can thus be seen that dust is the most frequent cause of hay fever, because it is the common carrier of all the obnoxious agents. The universal distribution of dust in cities as well as in the country, furnishes a ready explanation for the prevalence of the disease in all regions excepting in those which contaminated dust, on account of its weight, can only reach in very small quantities or not at all, such as high altitudes, the open sea, etc.

The entire or partial freedom which the so-called "hay fever resorts" enjoy is due to this fact. Very few, if any, of these places, however, enjoy absolute immunity. A strong wind, which, having passed over fields and become impregnated with their pollen or with the dust of a country road, is liable to bring one, a few, or many of the noxious agents within reach of the susceptible individual and cause in him the manifestations of the disease, if one or any of the substances to which he is sensitive are present. It thus frequently happens that only one or two persons among many are influenced. That some resorts insure immunity to some people and not to others, is explained by the fact that this immunity depends upon the presence within a certain radius, of the irritating substance. If a plant to which a subject is sensitive happens to grow within that certain radius, the location will naturally be unfavorable to him.

It has been frequently demonstrated that hay fever can be induced at any time of the year, and in regions where the disease never presents itself primarily, as in high altitudes or on the high seas, by the accidental presence of an irritant, brought there as a part of the dust covering clothes, parcels, etc. Wyman and his son were thus attacked, while spending the hay fever period at a resort where they enjoyed absolute immunity, when a package of rag-weed plant was opened there. The paroxysms brought on by handling dusty objects which have been so for some time, or those occurring at sea several days after leaving port, are thus accounted for.

The extreme degree of irritation occasioned in most sufferers by riding in steam-cars or in a carriage *only* during the hay fever period, and due to the quantity of dust shaken up by the vehicle, adds further evidence in favor of the fact that uncontaminated dust is not a factor in the production of an access, since dust is present the year round and the membrane is not irritated at all times of the year; but that that dust becomes an active irritant in this affection only when contaminated with the substances to which the subject is susceptible. This contamination only taking place at a certain period each year, dust is only an irritant during this period; in other words, it only acts as a cause of the affection at certain seasons, because it is only during those seasons that the pollen in its active state is present in it.

As to the second condition essential to the production of an access, a predisposition on the part of the system to become inordinately influenced by certain substances, a close examination into the family history of the patient, and into his own since birth, will elicit much evidence towards proving that there is a systemic dyscrasia, through which the resisting power to certain diseases is diminished. In a list of forty cases now before me, I find that thirty-five per cent. have near relatives who present a clear history of hay fever or rose cold, and that forty-two per cent. have asthmatic relatives. It is thus shown that in a majority of cases (the percentage of family histories presenting either asthma or hay fever being fifty-five) there is an inherited predisposition to the affection.

Going further and taking a glimpse into the early life of these cases, I find that forty per cent. have had *six* of the diseases incident to childhood, that sixty per cent. have had at least *five*, eighty-two per cent. at least *four*, ninety per cent. at least *three*, and that none were exempt, while one only had but one of them. These diseases were whooping-cough, measles, mumps, chicken-pox, scarlet fever, and croup. This singular proclivity to so many of these affections is certainly not a mere coincidence, the number of cases being too large to render such a proposition tenable. It seems to indicate a predisposing state of the system to all affections in which a neurotic element plays an important part, evidenced in the exanthemata by the eruption, in whooping-cough by the abnormal irritability of the pharynx, larynx and trachea, in the mumps by the marked tendency to reflex metastasis, and in croup by the spasmodic element inducing the dyspnœal paroxysms. That an inherent liability to these diseases must be present is further demonstrated by a comparison with the histories of forty persons not subject to hay fever, in whom *ninety-two* of the so-called diseases of childhood had occurred, representing an average of *two and two-tenths* per cent., while in hay fever sufferers, *one hundred and eighty-nine* children's diseases had presented themselves, an average of *four and seven-tenths* per cent.

Still more curious in this connection, is the fact that of the forty cases upon which these remarks are based, *all have had whooping-cough.* Of all the affections cited, this is without doubt that in which the neurotic element is most marked. Both the respiratory and sympathetic nerve-centres are disturbed in its early stages, while the pneumogastric becomes implicated before the local causes of excitation are established, doubtless indicating a primary nervous element as a predisposing cause, while the universal presence of the affection in forty cases of hay fever, certainly suggests a common systemic cause for both diseases—*an abnormally sensitive nerve-centre upon which the element of contagion or the irritant acts with effect.*

In further support of the theory of systemic predisposition, I will enumerate a few of the cases presenting the greatest evidences of heredity, in which this heredity seems to have exerted some influence in the production of the so-called children's diseases:

Case No. 14, whose mother, uncle, and brother have hay fever, while his grandfather and first cousin have spasmodic asthma, has had the six diseases of childhood. No. 13's two brothers have hay fever; his mother and sister asthma; has had five (croup omitted). No. 15, great grandfather and first cousin, hay fever; grandaunt asthma; has had five (scarlatina omitted). No. 31, father, hay fever; great grandfather, two great uncles, asthma; six diseases, while all those presenting a direct maternal or paternal heredity of hay fever and rose cold, with one exception, have had the six diseases.

Accepting the theory as conclusive, as far as the question of heredity as a factor in the causation is concerned, a new problem suggests itself: In those cases in which no evidence of heredity appears, what is the origin of the inordinate irritability? In other words, the possibility of an inherited liability being demonstrated, can it be acquired independently of heredity?

Of the nineteen cases in which no hereditary history could be traced, *fifty-five per cent.* have had *six* of the children's diseases enumerated, while *eighty-two per cent.* have had at least *four*, one case only having had but two. In the three cases which presented two or three diseases, I find that in one case, there is a subsequent history of typhoid fever, malarial fever, and bronchitis, all occurring before the first access of hay fever; in the second, migraine was a frequent visitor before the hay fever presented itself; while in the third, a child, the whooping-cough and chicken-pox had been very severe.

Taking the rationale of these sixteen cases, with a history of at least four diseases, all of them presenting marked neurotic element, is it not probable that a functional derangement of the nerve-centres resulted, and that they were thus rendered more sensitive to influences which, had they been in their normal state, would not have affected them? Again, is it not reasonable to suppose that in the first exception, the subsequent diseases accomplished what the others had begun, debilitating still more the nerve-centres, which had already been weakened to a certain degree by the early diseases? In the second exception, a neurotic element is apparent in the character of the primary disease, while in the third the virulence of the diseases must certainly have borne its influence on the secondary results.

Evidence to show that a neurotic element is an essential part of the affection, can easily be adduced by merely investigating the origin of the premonitory symptoms which are present in a number of cases. It would certainly be very difficult to explain their presence, were we to overlook the implication of the nervous system. Among the forty cases described, may be found one young man who complains of "a tickling in the roof of the mouth" one week before the onset; another patient speaks of dull pains in the head and back two weeks before; still another experiences chills and shuddering ten days before the attack, etc., while a large proportion complain of palpebral pruritus from two to ten days before the nasal symptoms begin. If the local irritant is the only cause, why does the respiratory tract, the portion of the body first and most exposed to its effects, not become immediately influenced? At this juncture a question naturally suggests itself: What then induces these premonitory symptoms? Again referring to the cases, we will find that premonitory symptoms only present themselves in cases in which hay fever is of some years' standing. As the accesses become more frequent, the system habituates itself to these annual or bi-annual attacks, and periodicity becomes an element of the case, marked in proportion with the degree of impairment of the nerve-centres. As an illustrative case, I will cite that of a medical friend, who, in a letter to me, spoke as follows: "My attacks for some years past came with much regularity, about August 12th to 14th. On these dates this year, I arranged to be on the water, on Lake Ontario and the St. Lawrence River, and entirely escaped everything like sneezing and irritation of the nose and eyes. Still, I had the usual slightly hot and irritable skin, then an eruption of urticaria, accompanied by disordered stomach. This experience is precisely the same as in 1880, except that then I was on the Atlantic, on shipboard." In this case, the neurotic element is distinctly shown by the eruption and the gastric disturbance, while periodicity alone can explain the presence of the symptoms at the precise time and the favorable localities in which they manifested themselves.

As to the nervous symptoms occurring during the course of an attack, I am more disposed to consider them as due to reflex irritation from the local trouble than as originating primarily in the nerve-centres. During the access, the susceptibility of the reflex centres is developed to its utmost extent, and sunlight, a draught of air, etc., will give rise to most violent symptoms, which would not be the case at other times.

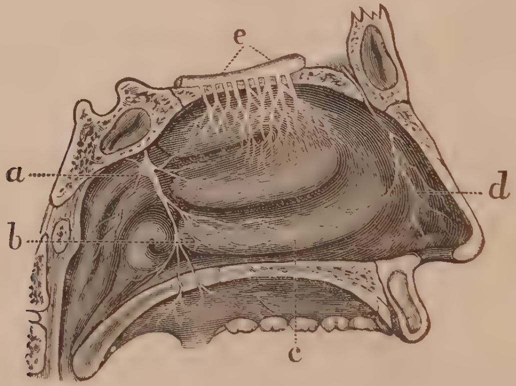
Accepting the above as conclusive in demonstrating the presence of a neurotic element, another question presents itself, which, left unanswered, would expose the theory to potent criticism: It being a recognized fact that in many individuals, there is impairment of the nerve-centres, either due to heredity or to disease, fully as extensive as in the worst hay fever subject, how is it that hay fever does not manifest itself in all these individuals? To answer this, the third condition comes to our rescue: In persons who are not subject to hay fever, the nasal mucous membrane is either in its normal state, or, if diseased, the local trouble is not of a nature to induce an abnormal susceptibility to irritation, and the systemic dyscrasia is not awakened to action, while in the hay fever patient, an hyperæsthetic state of the mucous membrane, either latent or due to local disease, is always present, furnishing a vulnerable or sensitive area through which the impaired nervous system can become influenced by the external irritant. *Both systemic and local elements must exist simultaneously to render a paroxysm possible.*

That the local condition of the nasal mucous membrane is an essential factor in the production of an attack, was demonstrated by the results attained with a treatment in which this point was kept in view. As long as it was overlooked, all efforts to conquer the disease were fruitless. As soon, on the contrary, as its true importance was duly appreciated, the chances of cure became greater than in any chronic affection of the nose.

In July, 1883, Dr. J. N. Mackenzie, of Baltimore, demonstrated that "there exists in the nose a well-defined sensitive area whose stimulation through a local pathological process, or through *ab extra* irritation, is capable of producing an excitation which finds its expression in a reflex act, or in a series of reflected phenomena." It is located at the posterior end of the inferior turbinated bones and the corresponding portion of the septum (*b* Fig. 53). I have frequently been able to verify this assertion, not only in the production of cough, but also in the production of reflex asthma, in cases in which a predisposition to this affection existed. Professor Hack, of Freiburg, Germany, has also demonstrated that various reflex neuroses originate in a diseased condition of the nasal mucous membrane. Unlike Dr. John Mackenzie, however, he locates the area from which the reflex symptoms take their origin at the anterior extremity of the inferior turbinated bone (*c* Fig. 53), and advises the removal of the latter for the cure of hay fever. In cases in which there was anterior hypertrophy, without a history of hay fever, I have not succeeded as yet in producing by local pressure, any evidence of reflex action, while in some of the cases, the same procedure in the posterior portion of the nasal cavity (Mackenzie's area) would elicit marked reflex symptoms. The fact, however, that the terminal fibres of the nasal branches of the spheno-palatine ganglion and of the nasal branch of the ophthalmic meet there and form quite a network, certainly verifies the view held by Hack, as to its being a reflex area of importance. In cases of hay fever, however, I have almost invariably found marked hyperæsthesia in this portion of the nasal cavity, with reflex symptoms in the superior maxillary region.

In addition to these two sensitive areas, practical experience in a large number of cases has demonstrated to me that a third area, of no less importance than that of Dr. J. N. Mackenzie, exists in the anterior portion of the nasal cavity, near the angle forming the anterior boundary of the vestibule, and located upon the nasal wall, as well as on the septum. This area is indicated in Fig. 53 by the letter *d*. In the great majority of persons subject to hay fever, if not in all, the surface of the membrane in this locality is exquisitely sensitive, and the contact of a probe provokes intense itching and lachrymation.

Fig. 53.



a, Spheno-palatine ganglion; *b*, posterior area; *c*, middle area; *d*, anterior area; *e*, olfactory bulb.

It thus becomes evident that there are in the nose three areas capable of producing reflex symptoms in the course of a paroxysm of hay fever, and that the three combined form the key of the local nervous element. I do not wish to imply, however, that the three areas must necessarily take part in the production of an access; in some, only one of the three will be the "sensitive spot;" in another, the posterior and middle areas will be involved, etc., etc. Again, a difference of intensity may exist in the degree of hyperæsthesia; while one area may be but slightly sensitive the next may be extremely so. In cases complicated with asthma, for instance, I have noticed that both anterior and posterior areas are sensitive, the latter being principally so, both giving rise to more or less reflex manifestations, but that when the paroxysms are uncomplicated, the anterior area is much more sensitive than the posterior.

An explanation of the origin of this local hyperæsthesia would not be difficult did it involve the middle and posterior areas of the nasal cavity only. Here it may be caused by most of the affections of the anterior nasal cavity, from simple chronic rhinitis down to nasal polypi. But how can we explain its origin in the anterior portion of the cavity, which seldom takes part in the diseases to which the other portions are liable? This leads us to the discussion of another question: Can hyperæsthesia of the nasal mucous membrane occur idiopathically or is a pathological process necessary as a primary cause?

In three of the cases which have so far come under my care, examination some weeks before the access appeared, not only presented the cavities in their normal state, but I could not obtain from the patient any indication of the presence during the period intervening between the accesses of any, even temporary, local trouble. Artificial stimulation with the probe to ascertain the location of the hyperæsthetic spots, as first suggested by Roe, however, demonstrated clearly the presence of several of them, and in one case gave rise to a number of reflex symptoms. It thus appears evident that a healthy membrane, in the ordinary sense of the word, can become hyperæsthetic without having undergone a local pathological process, and this be due to implication of the nasal nerve-supply in the general neuræsthenia. But the small number of hay fever sufferers among the large number of neuræsthenic people, makes this theory hypothetical, and the more plausible and less criticisable one of local chronic disease as a cause of the hyperæsthesia must be accepted. In the three cases in which no disease could be discovered, then, a pathological process, not sufficiently marked to be appreciated by ocular inspection, must have been present. As far as the anterior sensitive area is concerned, it is not unlikely that the proximity of an active pathological process maintained, by continuity of tissue, a latent inflammatory state which caused the hyperæsthesia.

As to the differentiation of one irritant from another, I believe, with Dr. J. N. Mackenzie, that it resides in the nerve-centres themselves. Their abnormal state renders them much more susceptible to the effects of external influences, and their discriminating power is increased in proportion. Let there be in a certain subject any unusual susceptibility to any particular substance or substances, this will be increased in proportion to the degree of disturbance in the nerve-centres, the result being an exalted reflex manifestation. This peculiar susceptibility to certain substances is well exemplified by the violent coryza brought on in some persons by ipecacuanha. So sensitive are some to its effects, that a few moments spent in a drug store are sufficient to cause an attack.

A number of secondary circumstances seem to exert some influence in the production of the affection, the principal of which is nationality. It is a strange fact that the Americans and the English are the principal sufferers. It might not be amiss to suggest that these are the only two great tea-drinking nations, and that this beverage may exert a depressing influence on the nerve-centres, and aggravate an inherited or acquired neuræsthenia.

The affection seems to be most frequent among people of education and those in comfortable circumstances, or whose occupation is sedentary. This may be due to a lack of wholesome exercise in the open air, a fact which I have been able to appreciate in the great majority of cases.

Heredity has been shown to exert great influence in the etiology of the affection, thirty-seven per cent. of the forty cases alluded to in the first part of this essay, having relatives who are sufferers of either rose cold or hay fever, while asthma, which is, as shown, a predisposing cause, is present in eighteen per cent. more.

The affection seems to be somewhat more frequent in men than women, the use of tobacco and other pernicious habits in the former being possibly accountable for the difference.

Pathology.—An important point in connection with the curative measures to be adopted, is a proper recognition of the fact, that each nasal cavity is divided into two regions which have distinct physiological functions,—the olfactory region, in which the sense of smell is located, and the respiratory region, the function of which is to purify the air of foreign substances, besides furnishing it with the necessary moisture and warmth before it reaches the lungs. As can be seen in Fig. 53, the filaments of the olfactory nerve cover the superior turbinated and the upper third of the middle turbinated bone. They also cover the corresponding portion of the septum. The upper part of the nasal cavity is thus devoted entirely to the sense of smell and not involved in the pathological etiology of hay fever.

The respiratory region which includes, as already stated in the chapter on anatomy, all the surfaces below the olfactory, is under the control of vaso-motor nerves of the sympathetic system, and is exceedingly sensitive to local or peripheral irritating causes. This sensitiveness, however, does not reside in the vaso-motor supply, which is only a secondary factor in the production of turgescence, but in the terminal filaments of the sensory nerves distributed over the surface of the membrane. A brief allusion has already been made to these, when speaking of the different hyperæsthetic areas, but they were not sufficiently described to render a clear outline of the pathological process possible. Commencing with the posterior area, we find that the membrane of that location is supplied by several branches of the spheno-palatine ganglion, which enter the back part of the nasal fossa by the spheno-palatine foramen. Besides its motor and sensory roots, the spheno-palatine ganglion possesses a sympathetic root, which is derived from the carotid plexus through the vidian, thus forming a well-defined connecting link between the nasal membrane and the sympathetic system.

In the production of the reflex symptoms peculiar to the posterior area, cough and asthma, the impression is consequently transmitted from the posterior end of the inferior turbinated bone or the corresponding portion of the septum, to the spheno-palatine ganglion; from that to the carotid plexus, which is closely connected with the posterior pulmonary plexus, formed not only by the branches of the sympathetic but also by some from the pneumogastric, and finally to the ramifications of the air-tubes through the ultimate filaments of the former, which are lost in the bronchial mucous lining. In many cases, however, the asthma is not due to reflex action, but to the gradual extension of the catarrhal inflammation from the nasal membrane, down along the pharynx, trachea and bronchi. In these cases, the asthmatic symptoms only manifest themselves some time after the onset of the paroxysm. In both varieties the exciting cause and the ultimate results are the same, but in the one the link between them is the nervous system, while in the other it is the mere continuity of tissue. The frequently complained of symptom, itching at the roof of the mouth, is readily explained by the presence of a large number of branches which emanate directly from the spheno-palatine ganglion and are distributed throughout the membrane covering the inferior surface of the hard and soft palate.

The middle area being formed by the terminal fibres of the branches constituting the posterior and anterior areas, irritation over it may give rise to any of the reflex symptoms which the two former occasion.

The anterior area includes the nasal nerve, one of the principal branches of the first division of the fifth pair, the ophthalmic, which supplies the eyeball, the lachrymal gland, the mucous lining of the eye and nose, and the integument and muscles of the eyebrow and forehead. This distribution, and the fact that the ophthalmic is a sensory nerve, explains readily how a pathological condition involving the nasal nerve may produce so many varied symptoms. In the production of lachrymation and palpebral pruritus, we have the lachrymal branch, which supplies not only the lachrymal sac, but also the conjunctiva. In addition to this cause, however, closure of the tear duct certainly contributes greatly to the profuse lachrymation. The photophobia also finds an easy explanation, if we consider the communication existing between the first division of the fifth pair and the ophthalmic or ciliary ganglion, the filaments of which are distributed to the ciliary muscle and the iris. If we couple this with the fact that the pupil is dilated when the eyes are implicated in the paroxysm, we can understand how exposure to sunlight can aggravate symptoms of the affection, and appreciate the pathological verification which it furnishes. The conjunctiva, however, is often irritable *per se.*

In accordance with these views, the production of a paroxysm may be briefly described as follows: A given irritant coming in contact with the hyperæsthetic nasal membrane in a neuræsthenic subject, the impression made on the former is transmitted through the afferent fibrillæ of the nearest set of sympathetic ganglia to those ganglia, and returned by them to the vaso-motor nerves of the membrane. The result is the same as in acute rhinitis—a primary contraction of the vessels followed by dilatation, the venous sinuses or corpora cavernosa becoming filled with venous blood and remaining distended. Violent sneezing occurs as soon as the membrane of the septum and that over the turbinated bones touch, and reflex asthma presents itself if the distention is sufficiently great in the posterior area to cause pressure against the septum. In the anterior area, the manifestations are not local, but occur in the parts which are in direct nervous communication with it. We thus have lachrymation, photophobia, headache, facial and palpebral pruritus, and so forth. If the distention is great in the middle area and nowhere else, we may have the whole train of symptoms, both anterior and posterior areas being involved, while implication of the posterior area will give rise to asthma if there is sufficient turgescence to cause pressure against the septum, and if the asthmatic tendency exists in the patient. As to the general systemic disturbances present in connection with the head symptoms, they are easily accounted for by the momentary increase of the abnormal excitability of the nerve-centres.

In my opinion, a paroxysm brought on by peripheral irritation, exposure to draughts, wind, dampness, etc., or occurring as a reflex manifestation from other parts of the body in an abnormal state at other times than in the hay fever season, cannot be considered as hay fever. It is an attack of acute coryza, due to the fact that the nasal mucous membrane receives its vaso-motor innervation from a ganglion which is the part of least resistance in the patient's economy, and which does not require a *special* agent to become influenced.

Symptoms.—The symptoms of hay fever may be limited to those of a mild coryza and last only a few days, or they may assume such violent form as to cause the patient great suffering. The attack usually begins with a sensation of itching in the nostrils, which soon becomes very intense, and causes violent and prolonged sneezing. A pricking, burning sensation in the inner canthi, followed by profuse lachrymation, may accompany this symptom, or constitute the first evidence of the access. Very soon the nose becomes occluded through turgescence of its lining membrane, and respiration through it is practically impossible. A watery discharge appears, which soon becomes very profuse, and its strongly alkaline character causes it to irritate the nostrils and the upper lip, sufficiently sometimes to give rise to painful excoriations. Violent sneezing may begin at once, or occur when the watery discharge begins to trickle down along the intra-nasal walls, and the patient makes futile efforts by immoderate use of the handkerchief, to clear the nose of the cause of irritation and obstruction. Chilly sensations, frontal headache, tinnitus aurium, loss of smell and taste, violent itching at the roof of the mouth, pain over the bridge of the nose, facial pruritus, and general symptoms, such as slight pyrexia, urticaria, disordered stomach and flatulence, are among the possible accompaniments of this stage.

As the affection progresses, the nasal secretion assumes more of a mucoid character, becoming at times muco-purulent. The conjunctiva may become greatly inflamed, and photophobia and marked chemosis follow, rendering, in some cases, a prolonged stay in a dark room necessary.

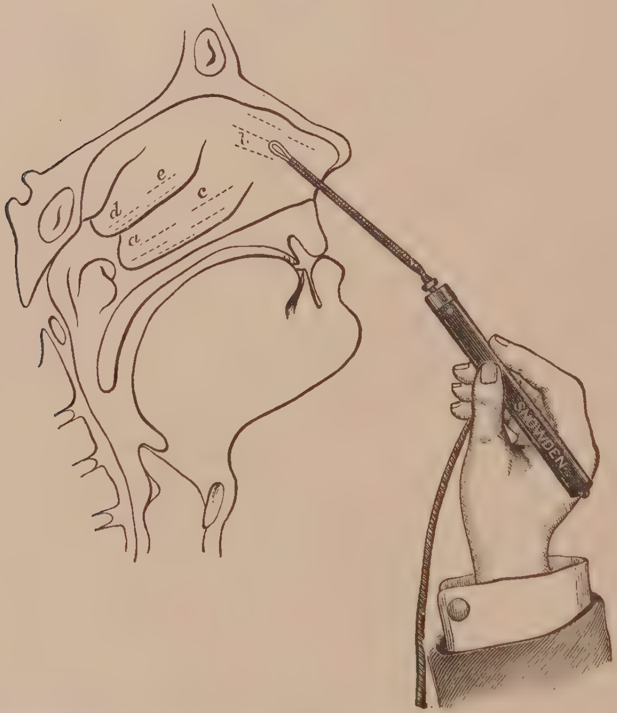
Premonitory symptoms are present in a small proportion of the cases, especially in those of long standing. Frontal headache, general malaise, chilly sensations, and itching at the roof of the mouth and eyes, occurring from two days to two weeks before the attack, are among those most frequently complained of. Asthma may occur as a complication of the affection, or as its only symptom. In the former case, it may present itself any time during the course of the disease; in the latter, it manifests itself suddenly as soon as the irritating agent is inhaled. In the majority of cases, however, it begins a few days after the primary nasal symptoms have shown themselves, and as soon as these become marked. A feeling of soreness in the region of the pharynx is experienced, followed shortly after by hoarseness, slight cough, scanty expectoration, and a feeling of constriction about the chest, and the asthma comes on insidiously, gradually increasing in intensity as the disease advances. It is generally much worse at night than in the day-time, relief coming on with the dawn of the day. In some cases it ceases with the nasal symptoms, or soon after; in others, and this forms the majority, it lasts much longer, prolonging the suffering of the patient over weeks and even months.

The affection presents itself twice in the year in some individuals, while in others it either occurs in May or June, or during the last two weeks of August or early in September. The summer variety, generally called "rose cold," is not as a general thing as severe as the autumnal variety or "hay fever," and does not last as long. Subjects of the disease can in almost every instance predict the exact day, and sometimes the hour, of the onset of the expected attack.

Curative Treatment.—The first indication in the curative treatment of hay fever is to ascertain by careful examination of the nasal chambers, whether the condition which gave rise to the hyperæsthesia is sufficiently marked to receive special attention. In the great majority of cases, a simple chronic rhinitis exists with a tendency to frequent or permanent turgescence of the mucous membrane. In others we have true hypertrophy, involving either the anterior or posterior portions of the nasal cavities, or both. Occasionally we find polypi, which occlude more or less one or both cavities, while a deviated or thickened septum may keep up a marked irritation and constitute a serious obstacle to a subsequent thorough treatment. When these, or any other abnormal condition compromising mechanically the lumen of the cavities, are present, they should first receive attention, and the nasal cavities returned as nearly as possible to their normal state. If the treatment employed be one of a destructive nature, the organic changes induced by it in the mucous membrane proper will often be sufficient to annul its hyperæsthesia. This was exemplified by the cases reported by Daly, Roe (first paper), in two of the first reported by me, and in several reported by Dr. Harrison Allen. In a large proportion of patients, however, it does not suffice, and immunity from the disease can only be expected after each sensitive spot has been thoroughly cauterized.

Organic alteration of the *surface* of the membrane, first proposed by me in December, 1883, can be induced by the application of galvano-cautery or of caustic acids. Each sensitive spot must be ascertained and treated with the agent used until the exaggerated sensitiveness is replaced by the normal sensation of contact. When the galvano-cautery is to be used, it is very essential to have a battery powerful enough to cause the platinum loop to suddenly attain white heat, so as to avoid the pain caused by the gradual increase of the temperature, and prevent prolonged radiation. This condition being fulfilled, we require a loop, which, upon being entered into the nasal cavity, will be sufficiently blunt at the point and edges not to scratch or cut the mucous membrane, when gently passed over it. I have found the tip shown in Fig. 54, which resembles an ordinary cautery knife, but is more rounded at the point and somewhat broader, most satisfactory. It can be easily introduced in all the sinuosities of the fossæ.

Fig. 54.



The cautery knife applied to the anterior area. *c*, middle area; *a*, posterior area; *d* and *e*, sensitive surface of middle turbinated body.

The nasal cavity being properly dilated and illuminated, the cautery knife is introduced gently and applied flatwise to the anterior area as indicated in the cut. If the part is not sensitive, the patient will not wince, the sensation being hardly more than a slight itching. If it is hyperæsthetic, a feeling of intense itching or burning will be complained of, followed, in some cases, by profuse lachrymation. As soon as the evidences of abnormal sensitiveness appear, care should be taken not to move the platinum tip, and the circuit being closed, the metal singes the spot, destroying the superficial nervous filaments. If the platinum becomes white hot immediately, comparatively little if any pain will be experienced, but the contrary will certainly be the case, if a weak current, or a knife so thin that the nasal mucus will prevent it from becoming heated rapidly, is used.

One spot being cauterized, another sensitive spot is searched for by gently passing the loop over the surface until the patient complains of the sensations experienced before, when the current is again applied. In this manner the entire respiratory area should be gone over, until the instrument can be applied to any part of the membrane without exciting reflex symptoms or causing the violent itching or burning, which the patient soon learns to recognize.

The pain accompanying these applications varies according to the degree of heat employed. White heat, which cauterizes in an instant, destroys the nerve filaments before they have time to convey the sensation of pain to the nerve-centres. Cherry heat causes some pain, while black heat is exceedingly painful. White heat, therefore, should always be employed for superficial applications.

The cauterizations should always be begun in the anterior portions of the nasal cavity (except when reflex asthma is present as a complication of the affection, for reasons which will be explained later on), so that the anterior hyperæsthesia will not be present when the posterior parts are examined, and thus conceal the sensitiveness, or convey a wrong idea as to its location. The septum should be as carefully examined as the turbinated bones, and any spot of even doubtful hyperæsthesia cauterized.

Three or four spots in each cavity can be cauterized at one sitting, and it is best to locate them some distance apart. A sensitive spot being found in the upper part of the anterior area, for instance, and cauterized, the next spot should be looked for in the lower part of the septum, etc. In short, the object should be to avoid large superficial abrasions, numerous small ones healing much faster and producing no disagreeable after-effects. In the great majority of cases, a few minutes after the applications are made, all annoying sensations are passed, and the patient can return to his business without fear of being in the least troubled. In some few, however, the membrane swells for a while, and the patient may experience difficulty in breathing through the nose. When such is the case, one nostril should be treated at each visit, so as to preserve for the patient the patency of the other, and thus insure him comparatively free respiration.

In two cases, so far, the applications were followed by an attack of coryza, accompanied by reflex symptoms. In one case it lasted ten hours, in the other it continued about twenty-four.

The membrane covering the middle turbinated bone does not seem to enter the process of resolution after galvano-cautery applications, as readily as the other portions of the respiratory region. In three cases in my practice, œdematous inflammation took place, which caused me to mistake the overhanging grape-like protuberance for a polypus. In one case I snared it off, causing immediate recovery; the two others were left to themselves, and disappeared after a few weeks. Fortunately, the limited innervation of the surface of the middle turbinated membrane, renders but few applications necessary, and they should be made sufficiently far apart to insure complete resolution after each sitting.

Important in this connection is the proper topographical recognition of the olfactory membrane, which includes the upper third of the middle turbinated body. Care should of course be taken not to cauterize it, and to limit the applications over the turbinated bone to its lower half. With this precaution, no danger to the sense of smell need be apprehended.

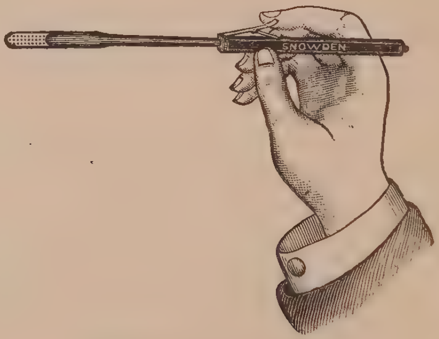
The number of applications required to render immunity positive, depends of course, upon the number of sensitive spots. With some, five sittings are sufficient, while in the majority of patients from fifteen to twenty are required, each from three days to one week apart, the length of the interval depending upon the rapidity with which resolution of each cauterized spot takes place.

When the physician is not possessed of galvano-cautery instruments, acids may be used instead. Chromic acid would be the best of any, were it not for the danger of general toxæmia following its application over comparatively large surfaces. Glacial acetic acid, with which I treated my first cases in the spring of 1881, is the most satisfactory in every way except one—the pain its application gives rise to, on account of the quantity which has to be used. This fact, however, can in a great measure be corrected by dissolving in it hydrochlorate of cocaine to saturation. Another feature characterizing its use, is the turgescence which takes place after each application, as stated when speaking of the treatment of anterior hypertrophies. The hydrochlorate of cocaine seems also to influence this result, by limiting the inflammation markedly and advancing resolution. Dr. Beverly Robinson, of New York, has reported good results with applications of pure carbolic acid. Unlike when it is applied to other parts I found that this acid caused much pain, besides imparting its well-known odor, and I therefore discontinued its use.

Nitric acid should never be used, except for the reduction of hypertrophies as described.

For the application of glacial acetic acid, the instrument shown in Fig. 54 will be found very satisfactory. It consists of two probes, shaped like Bosworth's (Fig. 31), in close apposition, their surfaces being so flattened as to render their contact perfect. One of the probes is fastened to the handle and is furnished with a number of shallow holes, a distance of one-half inch along the inner surface of its extremity, so that a drop of acid will be retained when the other probe is placed over it. The latter having free longitudinal motion, can be moved freely along the other by means of a finger lever, thus uncovering at will the acid-covered surface. The two probes are so arranged that they can be rotated together on their axis, so that the acid-covered surface can be made to face any direction. Their broad ends being of silver, the acid does not affect them.

Fig. 54



Author's glacial acetic acid applicator.

The manipulation of this instrument is precisely the same as that of the galvano-caustic knife. Being introduced into the cavity, a sensitive spot is searched for with both probes in apposition, and as soon as it is found, the finger lever is depressed and the acid probe being uncovered, the spot is cauterized. The finger lever is then allowed to raise, and the instrument can be withdrawn without cauterizing any other surface. Care should be taken to cleanse the instrument carefully before entering it into the nose, lest some acid remain over its surface.

As to the period when the applications should be made, I am of the opinion that the treatment should be begun at least two months before the expected attack. There is sufficient time left then, to annul all the hyperæsthetic spots (in the great majority of cases) without having to crowd the applications together, an unsatisfactory procedure, since the inflammation is likely to impair the abnormal hyperæsthesia and prevent proper recognition of the sensitive spots.

In three cases so far, I have been able to arrest the paroxysm from one to three weeks after it had begun, and when it was at its height. This result, however, cannot be expected in every case, but the applications are beneficial in all, and reduce in a marked manner the intensity of the paroxysm and its duration. Of seven cases treated last season in the midst of the hay fever, three were entirely relieved, three were much benefited, and the seventh was enabled to return to his business, from an imprisonment in a dark room. Although his sufferings were much abated, they continued until the end of his usual six weeks.

When the treatment is begun at the proper time, *i.e.*, several weeks before the paroxysm, its success depends entirely upon the thoroughness with which both nasal cavities have been relieved of their sensitive spots. An insufficient number of applications, or a timid patient, are as likely to prevent a radical cure, as a thorough treatment in a plucky patient is certain to be rewarded with permanent immunity.

An important point in connection with the results of imperfect cauterization is that however limited the number of applications may be, the benefit produced, as far as the nasal symptoms are concerned, is proportionate with that number, and with the thoroughness with which they are performed. When but a limited number of applications are made before the period of attack, the onset of the paroxysm is retarded, which naturally curtails the duration of the disease, while its intensity is reduced.

Again, when reflex asthma is a complication of the affection, and an insufficient number of applications have been made, this symptom is likely to appear as the sole expression of the paroxysm, the head symptoms being absent, or if present, exceedingly mild. This is doubtless due to the fact that the first applications being made anteriorly, the sensitive spots in the anterior and middle areas are more or less deprived of their hyperæsthesia (the presence and intensity of the head symptoms depending upon the thoroughness with which this is done), and the posterior area being only cauterized towards the end of the treatment, the symptoms which are secondary to its irritation present themselves.

A conclusion which I have come to lately, and which is borne out in the above cases and by close observation in all the others, is that when reflex asthma exists as a complication of the head symptoms, a greater number of applications are required than when it does not, and that immunity from all the symptoms can only be obtained when all three of the sensitive areas have been thoroughly treated, the treatment of the posterior area being such as to limit the inordinate power of turgescence, which is always present when true hypertrophy does not exist. In accordance with this view, I now direct my attention first to the posterior area, *when reflex asthma exists*, employing chromic acid, galvano-cautery, or the snare écraseur as needs be. This is greatly facilitated by annulling the hyperæsthesia of the anterior and middle areas with a four per cent. solution of cocaine.

In the cases in which asthma is the only symptom, this procedure, when thoroughly conducted, will often suffice to cure the affection, even, sometimes, when mild head symptoms are present (these being due to implication of what terminal filaments of the nasal nerve may extend in the sensitive region), but, as these cases are rare, applications to the anterior and middle areas are nearly always necessary.

Again, a mild case of hay fever, complicated with reflex asthma, may be due solely to hyperæsthesia of the middle area, and be cured by a treatment limited to it. Here, the asthma is due to the turgescence of the posterior area occurring as a result of the inflammatory process, while the head symptoms are induced, as just stated, through implication of the nasal nerve in the hyperæsthetic region. I am of the opinion, however, that it is always best to include the posterior ends of the turbinated bodies in the treatment.

As stated under the heading of *Pathology*, catarrhal asthma, which occurs late in the history of the affection, is much more frequently met with than the reflex variety, which comes on as soon as the Schneiderian membrane has become sufficiently turgid, through the local inflammation, to induce pressure against that of the septum. Being due to extension of the inflammation by continuity of tissue, it can only present itself, provided the nasal symptoms take place, and prevention of the latter will obviously deprive the asthma of its primary cause and prevent it.

When the membrane is free from hypertrophies, etc., cauterization of the sensitive spots, whether these be situated in the anterior, middle, or posterior areas, will therefore be sufficient to prevent both head symptoms and asthma, a fact so far demonstrated in six cases.

When the head symptoms solely characterize the accesses, the greatest hyperæsthesia will be found in the anterior area, which will of course require the brunt of the treatment. Any other sensitive spot, however, should also be effectively cauterized.

After-effects of the local treatment.—Although the number of cases treated so far has been rather large, I have not had to regret any ill-effect occurring as a result of the treatment. The sense of smell instead of being obtunded, is frequently improved, especially when anterior hypertrophies are reduced in the course of the treatment. This is easily explained by the fact that the olfactory membrane is not involved in the treatment, and that by facilitating the passage of air by the reduction of the tumefactions, the odoriferous particles can reach the olfactory area in greater number and with more freedom.

The permanent nasal hyperæsthesia which exists in the majority of hay fever cases, through which irritating substances cause much annoyance, itching, sneezing etc., is naturally obviated in every instance.

As to the permanency of the immunity, it depends, of course, upon the thoroughness with which the treatment is conducted. A spot as large as a small pea, left in its hyperæsthetic state may not be active during the period of the first paroxysm, owing to the proximity of the curative treatment and the temporary local inflammation set up by it, while the following year, having reassumed its hyperæsthesia, it may occasion unmistakable, although slight symptoms of the disease. The patient should therefore be requested to call a couple of weeks before the usual date of the onset, in order that any hyperæsthetic spot that might exist, may be thoroughly cauterized.

Palliative Treatment.—The palliative treatment of hay fever may be conducted either during the attacks or, with a view to prophylaxis, during the interval between them. A well conducted tonic treatment, begun two or three months before the onset of the paroxysm, sometimes succeeds in markedly diminishing its intensity, nerve tonics, such as nux vomica, arsenic and phosphorus, being especially valuable. When anæmia exists, iron should be given. Rabuteau's pills of the carbonate of iron have in my hands given better satisfaction than any other make, not giving rise to constipation or producing other deleterious effects. Quinia, six grains taken daily in divided doses, is also very valuable in some cases. Morell Mackenzie recommends a pill of valerianate of zinc, one grain, and compound assafœtida pill, two grains, beginning some time before the expected attack, and doubling the dose at the end of ten days or two weeks. Out-door exercise is an important adjunct to the treatment, while vigorous friction with a rough towel every morning, tends greatly to invigorate the system.

When the patient cannot leave for some location in which the absence of the irritant or irritants which affect him insures immunity, high altitudes, the sea or the seashore, a number of prophylactic measures may be taken to reduce the violence of the attack. Of these, plugging the nostrils with cotton is probably the most effective, the irritant being thus arrested at the entrance of the cavities, and not reaching the sensitive areas. Care should be taken not to push the plug too far in, lest the contaminated atmosphere pass above it. It should be introduced just within the nostril, and so adjusted that the inhaled air be forced to pass through it. In some cases, even that does not prevent the entrance of the irritating agent. The nostril should then be hermetically closed with cotton, and the respiration be conducted through the mouth for the time being, taking care to keep the lips moist and as near together as possible, in order to imitate in a degree the functions of the nasal cavities. The patient should as much as possible avoid the sun, the reflex irritation of the nerve-centres which it ininduces through the eyes, increasing not only the local symptoms, but also those of the respiratory tract. Large smoked blue spectacles are very effective for this purpose. Ladies can wear thick veils, which not only limit the access of pollen to the nose, but also avoid for them the effect of the glare of the sun and the irritating action of the wind upon the skin of the face.

Medicinal treatment is sometimes of benefit. The most effective drug at our disposal is cocaine, which is capable in some cases, of subduing a paroxysm. Applied in solution, however, its effect is slight, its strength being much reduced by the unusual amount of secretion present. Tablets of cocaine, gr. $\frac{1}{6}$ each, as proposed by Dr. Watson, of London, are much more effective. Being introduced into the nostrils, they dissolve in the mucus, and the solution formed comes in direct contact with the membrane.

Ointments are, in a large number of cases, the most satisfactory agents for local applications. The benzoated oxide of zinc ointment and vaseline, equal parts, not only soothes greatly the irritated surfaces, but if applied frequently, it seems to curtail the attack by limiting the access of the irritating bodies to the membrane. It should be applied as thoroughly as possible with a camel's hair pencil, after having liquefied it by holding the vessel containing it in hot water. Lennox Browne, of London, recommends highly an ointment containing a drachm of oil of hamamelis and one ounce of vaseline. Belladonna ointment, made with the aqueous extract, is also beneficial, the relief being further augmented by applying it over the nose likewise. The quinine spray, advocated by Helmholtz, is occasionally beneficial. In the majority of cases, however, it causes irritation, especially when used cold. One grain is dissolved in an ounce and a half of water and heated to 100° Fahr. A spray of bicarbonate of soda or of borax, three grains to the ounce, used at the same temperature, is sometimes very effective. Inhalations of the emanations of conium juice, using the auto-insufflator (Fig. 27), in which a cotton pledget has been introduced, is also beneficial at times, while three drops each of liquid carbolic acid and the oil of tar, used in the same manner, sometimes gives much relief.

For the eyes, a solution of two drachms of spirits of nitrous ether in six ounces of water, used with a coarse spray atomizer or applied with compresses, will be found useful. A two per cent. solution of cocaine, applied with a dropper, is very effective in most cases.

Internal remedies are sometimes of value. The elixir of valerianate of ammonia, a teaspoonful being taken every two hours, is sometimes surprisingly effective. Quinine, two or three grains three times a day, seems also to exert a beneficial influence. Morell Mackenzie recommends highly the pill of valerianate of zinc or assafœtida, already alluded to. For the asthma, a preparation containing iodide of potassium, gr. v, tincture of belladonna, ♏v, suspended in syrup of orange peel, administered every two hours until the symptom ceases, has proven exceedingly efficient in almost every case in which it was ordered. The inhalation of the fumes of nitrated blotting paper, or the smoking of stramonium or belladonna cigarettes is also advantageous in some cases. The depression which invariably follows and sometimes precedes an attack requires the moderate use of stimulants. The best of them, in my opinion, is wine of coca, which, theoretically, is admirably adapted to counteract the depressed state of the nerve-centres.

ANOSMIA.

Anosmia, or loss of the sense of olfaction, occurs as a symptom of several affections of the nasal cavity, and as a result of lesions of the olfactory bulb or other portions of the brain, of idiopathic or traumatic origin.

Nasal affections may give rise to anosmia by interfering mechanically with the access of the odoriferous bodies to the olfactory nerves, or by annulling their sensitiveness through extension of the inflammatory process to the olfactory area. Acute rhinitis, hypertrophic rhinitis, and nasal polypi can thus cause anosmia by the obstruction to which they give rise, while simple chronic and syphilitic rhinitis may act as exciting causes by involving the mucous membrane of the olfactory area in the local inflammation. Atrophic rhinitis may also give rise to it, the impaired or arrested action of the lubricating glands failing to furnish the fluids necessary to dissolve the odoriferous particles over the olfactory nerves.

Lesions of the olfactory bulb are in most cases due to a blow received either over the supra-orbital region or upon any other portion of the head. Its soft consistence causes it to become easily disorganized, and once broken up, it does not recover. Central brain lesions, tumors, abscesses, etc., are occasionally accompanied by loss of smell. The other symptoms of the case serve to clear the diagnosis. The olfactory bulb or its branches may be imperfectly developed or absent. The continued inhalation of strong odors, or tobacco smoke, by over-stimulating the olfactory nerves, also causes anosmia. This over-stimulation may also be brought about by the prolonged use of tobacco or other irritating snuffs. Certain drugs, such as morphia, alum, tannin, etc., when used to excess have been known to impair and even destroy the sense of smell. The sense of taste, owing to its close relationship with the latter, is impaired in the majority of the cases of anosmia.

Treatment.—When anosmia is due to an acute affection, the sense of smell usually returns when the latter disappears. In chronic conditions, the treatment applied for their relief is obviously that indicated for the anosmia, and it will meet with success if the integrity of the twigs of the olfactory nerve is not too greatly compromised. When olfaction has been absent for a number of years, the chances of recovery are very meagre, while in cases caused by blows or falls, a cure is not to be expected. When the condition acting as primary cause has been treated and the anosmia still persists, strychnine used locally is sometimes very efficient, combined with the application of the faradic current. The former may be administered as a snuff, one-fortieth of a grain being thoroughly triturated in two grains of sugar and used with the auto-insufflator (Fig. 27) night and morning. Care should be taken to introduce the tip of the instrument as far as possible, directing it towards the roof of the nose. The faradic current should be used every day, a moderate current being passed from the inter-orbital space to the occiput, the negative pole being placed over the former. Thoroughly wetting the sponges will insure penetration of the current, which would otherwise pass around the head.

CHAPTER XI.

DISEASES OF THE ANTERIOR NASAL CAVITIES.—*(Continued.)*

EPISTAXIS.

(Synonyms :— Nose-bleed ; Hemorrhagia Narium ; Rhinorrhagia.)

Etiology.—Bleeding at the nose may be due to traumatism, such as blows, falls, picking with the finger-nails, the introduction of a foreign body, forcibly blowing the nose, sneezing, etc. It is a frequent symptom of the majority of nasal tumors, and of the forms of rhinitis accompanied by ulceration. It occasionally occurs as a vicarious substitute for menstruation. An obstruction to the general circulation or any condition increasing the tension of the blood-vessels, may give rise to it, while a weakened state of the vessel walls, which may be local through prolonged catarrhal inflammation, or general, through degeneration of the vessels at large as a result of disease or old age, may act as a primary cause. It may also be the result of obstruction to the return of blood to the heart through pressure upon the jugular veins by tumors, closely-fitting neck-wear, etc. A constitutional susceptibility to hemorrhages exists in some individuals, the bleeding being at the nose in the majority of cases; in these, the liability to epistaxis may be congenital.

Epistaxis occurs as a premonitory or concomitant symptom in a number of affections, such as typhoid and remittent fevers, scurvy, diphtheria, and the exanthemata. In plethora and when the cerebral circulation is overloaded, a free nose-bleed is generally productive of great relief.

Pathology.—The profuseness with which the nasal mucous membrane is supplied with blood-vessels, furnishes a ready explanation for the copious hemorrhages which occur as a result of traumatism. A blow, by suddenly increasing the blood-pressure readily causes rupture of one or several blood-vessels. The fact that arterial blood is generally lost indicates that the venous sinuses are but seldom involved. Picking the nose, by denuding the membrane of its epithelium, exposes the underlying membrane proper, tearing some of the numerous blood-vessels. The hemorrhage sometimes originates in the posterior nasal cavity, especially in the mass of glandular tissue with which the vault is furnished.

Symptoms.—In epistaxis due to traumatism, the blood flows freely in most cases from one side. These hemorrhages usually cease of their own accord, and are not of long duration. In most of the other forms of epistaxis, the blood trickles by drops, which follow each other in more or less rapid succession. In nose-bleed occurring as a result of cerebral congestion, premonitory symptoms, such as headache, tinnitus aurium, injection of the conjunctiva, etc., are usually experienced, which are much improved or disappear altogether as soon as a certain amount of blood has been lost. In individuals subject to hemaphilia, the attacks may occur at any time, the least exertion serving sometimes to bring on a severe epistaxis. When the condition is due to vicarious menstruation, it usually presents itself about the time the latter should begin, with intermittent recurrences during the usual duration of the menstrual flow. In general softening of the vessel walls, nose-bleed usually begins after an exertion, and is exceedingly difficult to arrest. When the bleeding originates in the vault of the pharynx, the blood flows posteriorly when the patient is sitting up or standing.

Prognosis.—In almost every case, epistaxis is not followed by serious results. The lost blood is soon reformed, and prompt recuperation of lost forces takes place. When occurring in persons of great debility it may cause death by exhaustion.

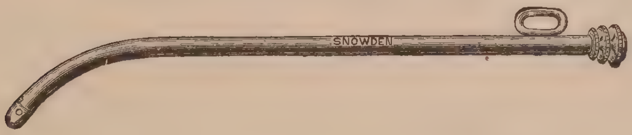
Treatment.—The position of the body bears great influence upon the violence and duration of an attack of nose-bleed. In a case seen in consultation, the epistaxis, although not profuse, had already lasted upwards of twelve hours, the patient having remained in the recumbent position, with his head hanging over a pail, throughout the entire time. The mere return to the upright position caused the flow to cease at once. When there is great tendency to coma, however, the sitting posture should be tried, and if this cannot be endured, lying flat on the back is the next best position.

The hemorrhage can frequently be arrested by simply closing tightly the bleeding nostril for a few minutes, especially when the flow arises from the anterior portion of the septum. Pressure upon the artery of the septum as it enters the nostril, or upon the branch of the facial, situated close to the alæ, will sometimes suffice. Raising the arms above the head to force the blood to mount against gravity, thus encouraging the formation of a clot, is also recommended. Derivative treatment, such as hot foot-baths, mustard plasters to the back of the neck, ankles, or chest, may also be employed, while stimulation of the vaso-motors can be induced by the application of cold in the form of ice, cold compresses, ice bags over the nose, forehead, nucha, etc.

When these simple means fail, the local application of styptics may be employed. Sniffling ice-water, into which a little salt has been dissolved, is sometimes very effective. Insufflations of tannic acid, gallic acid, or alum, either separate or combined, by means of the auto-insufflator (Fig. 27), or posteriorly with the scoop insufflator (Fig. 25), will arrest the bleeding in most of the severe cases. The styptic preparations of iron are preferred by some, but I have not found them more effective than the above, while their use is much more unpleasant to both patient and physician. Solutions of sulphate of zinc, acetate of lead, or sulphate of copper (gr. xxx–ʒj) may be applied with a syringe or with the atomizer. In connection with the treatment, blowing of the nose should be avoided for some time, so as not to remove the clots which arrest the bleeding mechanically.

When evidences of weakness become apparent, such as pallor, vertigo, etc., mechanical means must be resorted to. The simplest of these is to pack the bleeding cavity with pledgets of cotton, lint, or bits of sponge, previously dipped in some styptic solution, and of sufficient size to exert pressure when in place. Any blunt instrument may be used to mass them in, one after the other. They can be withdrawn with dressing forceps after twenty-four hours, and new ones replaced if necessary. Dr. R. J. Levis, of this city, uses small pieces of sponge passed successively over a piece of twine.

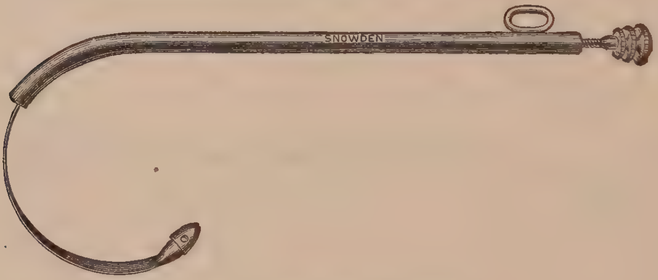
Fig. 56.



Bellocq's canula when not in use.

In some cases, the point of origin of the hemorrhage is so far back that anterior packing is not sufficient. Resort must be had to posterior tamponing, a rather difficult procedure in most cases. Bellocq's canula, an instrument especially adapted for the purpose, may be used. It consists of a metallic tube through which a curved steel spring moves freely. When the instrument is passed through the bleeding nostril, the curved spring is forced out by a movable rod connected with it, and its shape causes it to curl into the mouth, presenting a perforated knob, to which a string furnished with a cotton tampon the size of the patient's thumb, is attached. The instrument being drawn out, the tampon is pulled up behind the soft palate, and into the narium, which it closes up tightly. This procedure is very effective when the nasal cavity is sufficiently well formed and wide enough to allow the introduction of the canula. In the majority of cases, however, great trouble is experienced in introducing it, and in some cases, through marked deviation of the septum, the presence of hypertrophies, etc., the manipulation cannot be accomplished. A more universally successful procedure is to use a small flexible rubber bougie; when pressed into the nostril, it accommodates itself to the irregularities of the respiratory tract and finally emerges into the naso-pharynx, the wall of which causes the tip to turn downward and protrude below the soft palate, when it can be seen through the mouth and drawn out with a pair of forceps. A string furnished with a tampon being attached to it, when the bougie is drawn

Fig. 57.



Bellocq's canula when in position.

out, the tampon is drawn into place. The string should always be double so that one end will protrude through the nose and the other through the mouth, the two being tied over the upper lip to retain the tampon in place. Much trouble is sometimes experienced in passing the latter behind the soft palate, which will adapt itself against the pharynx and prevent its introduction. This can be avoided by passing the index finger through the isthmus and leaving it there until the tampon has passed into the pharyngeal vault. If left in place too long, tampons may cause systemic poisoning and tetanus; they should therefore be changed after twenty-four hours, or at most forty-eight.

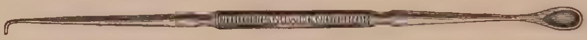
FOREIGN BODIES IN THE NASAL PASSAGES.

Children frequently insert foreign bodies, such as buttons, pebbles, cherry stones, beans, hairpins, etc., in their nasal passages, where they may remain impacted for a number of years. Insane people do likewise occasionally. In adults, foreign bodies are very rarely met with in the nasal passages, their introduction being generally due to accidental causes. Necrosed bones, when detached, become foreign bodies, and give rise to all the symptoms characterizing their presence. In a few rare cases the foreign bodies are ascarides or other human parasites, which are either forced up into the posterior nasal cavity by coughing or crawl up along the pharynx.

Symptoms.—At first the presence of a foreign body attracts but little attention. The timid child refrains from mentioning his mischievous act, and soon forgets it. After some time, a discharge of glairy mucus begins; this soon becomes purulent, and, if the foreign body presents asperities, may be tinged with blood. In some cases the discharge becomes extremely fetid. Round bodies, if small, cause a hardly perceptible discharge, which, nevertheless, is sufficient to excoriate the nostril. Beans, peas, and other vegetable substances, absorb the watery constituents of the secretion, swell considerably, and occasionally germinate, increasing greatly the intensity of the symptoms. When the bodies are large or hard, such as bullets, large pebbles, etc., they may occasion considerable pain of a neuralgic character, headache, etc. Obstruction to nasal respiration is of course proportionate with the size of the foreign body.

Treatment.—The extraction of a foreign body from the nasal passages is at times exceedingly difficult, especially when it has been in the cavity for a prolonged period, during which it sometimes becomes covered with a calcareous coat. It is generally deeply imbedded in the mucous membrane, and occasionally surrounded by fungous growths.

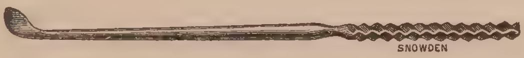
Fig. 58.



Gross' ear curette.

In ordinary cases, forcible sneezing, induced by tickling the inside of the nose, may be tried. If unsuccessful, the posterior douche may be more successful, used by raising the can above the head so as to obtain a powerful stream. Hall's syringe (Fig. 16) will be found very convenient, the force of the current being easily regulated. These failing, surgical means must be resorted to. In the majority of cases, such an instrument as Gross' ear curette (Fig. 58) may be used, the spoon-like tip giving the operator good purchase. Another convenient instrument is that shown in Fig. 59. A pair of delicate forceps may be more efficient in some cases. In these manipulations, however, care should be taken not to lacerate the membrane, and to avoid pushing the foreign body still deeper in the fossa. When the foreign body is deep-seated, a method which I have found effective is to pass a piece of slender wire along the floor of the nose as far back as the pharynx, withdrawing the end out of the mouth with forceps. A tampon of cotton or linen being securely attached to it, and drawn up behind the palate into the posterior nares, it is pulled through the nasal cavity along with the foreign body. In a case in which a pebble could not be grasped, I passed two wires, one above and one under it, into the mouth, then tied a long piece of strong tape between the two ends, thus forming a loop with which the foreign body was withdrawn as a cork is pulled out of the body of a bottle.

Fig. 59.



Bent tip curette. (Inventor's name could not be ascertained.)

RHINOLITHS.

Rhinoliths are calcareous concretions, varying in size from a millet-seed to an almond, formed by the accumulation of the alkaline constituents of the secretions (principally phosphate of lime) around a foreign body in the nasal passages. They sometimes originate from a small mass of desiccated mucus. A gouty diathesis is thought by Græfe to be favorable to their formation.

Symptoms.—The symptoms occasioned by the presence of rhinoliths resemble those of a foreign body. At first, however, its presence is hardly noticed, its effects becoming perceptible when it has attained a sufficient size. A nasal discharge, which gradually thickens, presents itself, and, as the inflammation of the surrounding mucous membrane becomes more and more marked, obstruction to nasal respiration takes place with its accompanying symptoms, nasal voice, anosmia, etc. Headache is a frequent symptom when the calculus is large. What part of a rhinolith presents itself, generally appears black; it can thus be mistaken for a necrosed bone, being partially buried, like the latter, in the mucous membrane. Its gritty surface may also cause confusion with dead bone, but the horrible odor emanating from the latter is of course absent.

Treatment.—An ordinary dressing forceps generally suffices to dislodge a rhinolith, but at times the mucous membrane surrounding it has to be first detached, an operation readily done with Professor Gross' curette, the spoon-shaped end being pushed between the stone and the membrane. When it is very large, a diminutive lithotrite has to be used to crush it and extract it piecemeal.

MAGGOTS IN THE NOSE.

The fetid odor accompanying certain catarrhal affections of the nose, occasionally attracts flies and other insects. When these penetrate the nasal cavity and deposit eggs within them, maggots are hatched, this process being assisted by the heat of the surrounding surfaces. The mucous membrane is destroyed by them, and the cartilage and bones become necrosed. This condition, however, is seldom met with in this country, occurring principally in India and in Central and South America.

Symptoms.—Itching in the nose is the first symptom. Formication and a gnawing sensation are then experienced, both increasing markedly. Occasional hemorrhages occur, accompanied by a profuse muco-purulent discharge. Great cephalagia is usually complained of. Convulsions and coma occur in fatal cases.

Treatment.—Inhalations of chloroform, as proposed by

Dauzat, are fatal to the maggots, and their destruction is the cure of the affection. Pure chloroform may be injected into the cavities when inhalations are not effective, a procedure harmless to the membrane.

CHAPTER XII.

DISEASES OF THE POSTERIOR NASAL CAVITY.

ACUTE POSTERIOR NASAL PHARYNGITIS.

(Synonyms:—Acute Catarrh of the Naso-Pharynx; Acute Retro-Nasal Catarrh; Acute Post-Nasal Catarrh.)

Etiology.—Acute inflammation of the posterior nasal cavity may occur primarily as a concomitant symptom of acute rhinitis and be due to the same causes, but it most frequently presents itself as a complication of that affection and of acute pharyngitis. It is sometimes caused by the inhalation of dust or other irritating particles, through mechanical action, and is a frequent accompaniment of a number of diseases of childhood, such as diphtheria, measles, scarlatina, etc. A scrofulous diathesis seems to predispose to it. The irregular climate of this country renders it of frequent occurrence, and, although its symptoms are seldom of sufficient intensity to require medical aid, it assumes great importance as the precursory stage of the so-called post-nasal catarrh.

Pathology.—Hyperæmia of the glandular tissue may take place as a result of peripheral irritation, as by cold, etc., the impression being transmitted through the sympathetic system, and causing a sudden contraction of the local blood-vessels soon followed by dilatation and engorgement, but I doubt whether in the naso-pharynx this occurs as universally as it does in the anterior nasal cavities, in which the vascular supply is very great, with a correspondingly important vaso-motor innervation. I am more inclined to consider inflammation here as due, in the majority of cases, to contiguity of tissue, and as a complication of an inflammatory process in a neighboring part.

In some individuals, especially those of a scrofulous temperament, a preternatural sensitiveness of the naso-pharynx causes it to become easily influenced by conditions which would in others bring on acute rhinitis, and a localized hyperæmia is engendered which either disappears or forms the initial step to further pathological changes.

Symptoms.—When the affection occurs as a complication of acute rhinitis, the symptoms of the latter, as regards obstruction to breathing and copious secretion, are so marked, that those occurring in the posterior cavity are generally overlooked. When the latter is solely affected, however, as is frequently the case in scrofulous subjects, the first symptom is a sensation of dryness or parchedness behind the soft palate, accompanied by a feeling of constriction, especially marked during deglutition, which sometimes becomes painful. A thick, starch-like secretion soon begins, and after a couple of days this becomes still thicker, assuming at the same time a purulent character. The discharges are hawked into the mouth or swallowed. The voice becomes shallow or thick, and sometimes quite nasal. Pain at the top of the head is frequently complained of. Hearing is sometimes compromised through participation, in the inflammatory process, of the mucous lining of the Eustachian tubes. These symptoms are generally well marked in affections such as diphtheria, scarlatina, etc., of which it is a frequent accompaniment. When the inflammation is marked, bleeding often occurs.

Examined rhinoscopically, the parts appear congested and somewhat thickened, and masses of the discharge described are seen clinging to the depressions and crypts of the lining membrane.

Prognosis.—Acute inflammation of the posterior nasal cavity may rapidly disappear, but in the majority of cases, it is the primary manifestation of the chronic condition.

Treatment.—As is the case with acute rhinitis, cases of this character seldom apply for treatment. When inflammation of the anterior and posterior cavities occur simultaneously, the treatment of the former suffices for both conditions, the one following the course of the other. When the posterior cavity is alone involved, however, the remedies are best applied directly to the parts by means of the insufflator devised by Dr. A. H. Smith, Fig. 26, or that shown in Fig. 61.

The powder recommended on page 69 will be found very effective when the case is seen early, the local hyperæmia being influenced in the same manner as in acute rhinitis. When the parts appear dry and parched, as they do at the very start of the trouble, a solution of bicarbonate of sodium (gr. v–℥j) will be very grateful to the patient, and in some cases arrest the attack at once. An atomizer with a curved tip must be used for the purpose, such as that in Fig. 60. A solution of sulphate of sulpho-carbolate of zinc (gr. v–℥j) is also very effective when the secretion is profuse, by causing contraction of the superficial blood-vessels and the glandulæ. A four per cent. solution of cocaine is doubtless as effective here as in acute rhinitis, especially when there is pain.

CHRONIC POSTERIOR NASAL PHARYNGITIS.

(Synonyms:—Chronic Catarrh of the Naso-Pharynx; Follicular Disease of the Naso-Pharyngeal Space; Post-Nasal Catarrh; Retro-Nasal-Catarrh.)

The almost universal prevalence of post-nasal catarrh in this country has given rise to much speculation among specialists, and many are the views advanced as to its etiology. The scope of this work not permitting their enumeration, I will but state those which I have personally entertained for some time, and which close observation and satisfactory results in a large number of cases, have led me to consider as the true one.

Etiology.—Chronic inflammation of the naso-pharynx may be due, firstly, to repeated attacks of acute posterior nasal pharyngitis occurring independently or simultaneously with acute inflammatory affections of the anterior nasal cavities; secondly, to chronic inflammatory processes in the neighboring parts, the anterior nasal cavities or the pharynx; thirdly, to the presence in the anterior nasal cavities of turgescences, hypertrophies, polypi and other growths and septal deviations, and all conditions which interfere mechanically with the performance of the physiological functions of the nose and with the anterior flow of discharges; fourthly, to a scrofulous diathesis, or a pseudo-scrofulous state of the system occurring as a result of a number of diseases, among which scarlatina, diphtheria, measles and smallpox are the principal.

Pathology.—A fact of great importance in connection with the pathological consideration of this affection, is the slowness with which glandular tissue enters resolution after having undergone an inflammatory process, as compared with other tissues. An acute inflammation of either the anterior nasal cavities or the pharynx having implicated the naso-pharynx, the profuseness of glandular elements in the latter cause it to retain, as it were, the inflammatory process much longer than the parts primarily inflamed. If the anterior cavities undergo a renewed attack before the naso-pharynx has fully recuperated from the preceding, the congestion of the glandular tissue is increased in proportion, and the chances of entire resolution are diminished. Renewed attacks decrease these chances more and more, until chronicity is established. This, it seems to me, is the course of events in the majority of cases of post-nasal catarrh in this country. The irregular climate and other causes, most of which have been enumerated in the chapter on the different forms of rhinitis, cause frequent attacks of acute rhinitis, and a few succeeding attacks are sufficient in most individuals to establish a chronic post-nasal inflammatory process.

In the second category of the causes enumerated, the process is the same, the post-nasal affection being merely a part of the general trouble.

In the third category, the chronic inflammation induced by the presence of hypertrophies, growths, etc., is in itself sufficient to cause by continuity of tissue, a catarrhal state of the naso-pharynx, this being further aggravated by the constant passage over it of more or less irritating discharges, which cannot, through the mechanical interference offered by the abnormal formations, be freely evacuated anteriorly.

In the fourth, the proclivity to inflammation peculiar to the scrofulous diathesis is the starting point of the trouble, while the recuperative powers are not sufficiently strong to cause resolution.

Symptoms.—In mild cases of post-nasal catarrh, the principal symptom generally complained of, is an increased discharge of mucus, a "dropping," as the patients term it, of starch-like, gluey lumps of thickened mucus, which adhere tenaciously to the surface upon which they are expectorated, after having been "hawked" into the mouth. This may occur several times, or only once daily, or less often. During the presence of the mass in the naso-pharynx, a feeling of fullness is experienced, the voice may be muffled or deadened, and acquire the nasal twang. After a year or more of this condition, the discharges begin to assume a purulent character, oyster-like, muco-purulent lumps taking the place of those described. These are occasionally streaked with blood, or present a brownish appearance which betokens its presence. Instead of being inodorous as before, these discharges may assume a somewhat offensive odor, especially if they have remained for any length of time pent up in the cavity. The hawking necessary to dislodge them is much more frequently resorted to, and habit being added to necessity, the patient is greatly annoyed and becomes a disagreeable companion. This is further aggravated, in some cases, by the extension of the inflammatory process to the lower pharynx and the larynx, which renders an occasional "hemming" a source of momentary relief for the patient. Dull pain on the top of the head is often complained of, while frontal headache is also present if the anterior cavities are affected. In some cases the memory seems to be dulled. The mouths of the Eustachian tubes are sometimes implicated, and the hearing may become compromised. In aggravated cases, the discharges assume a decidedly purulent character, forming hard, concrete scabs, which emit a fetid odor, and frequently present the shape of the surfaces from which they became detached. The efforts of the patient to discharge these masses, which have become almost dry by evaporation of their watery constituents, by hacking, coughing, scraping, etc., now become more frequent. This maintains the soft palate in a congested condition, and after a time its volume becomes increased, causing drooping, and the symptoms of elongated uvula are added to the others, a coated tongue, general congestion of throat, nausea, a hacking cough, etc., while dyspepsia may be engendered by occasional, unavoidable swallowing of the discharges. Patients of this kind generally present an anæmic appearance.

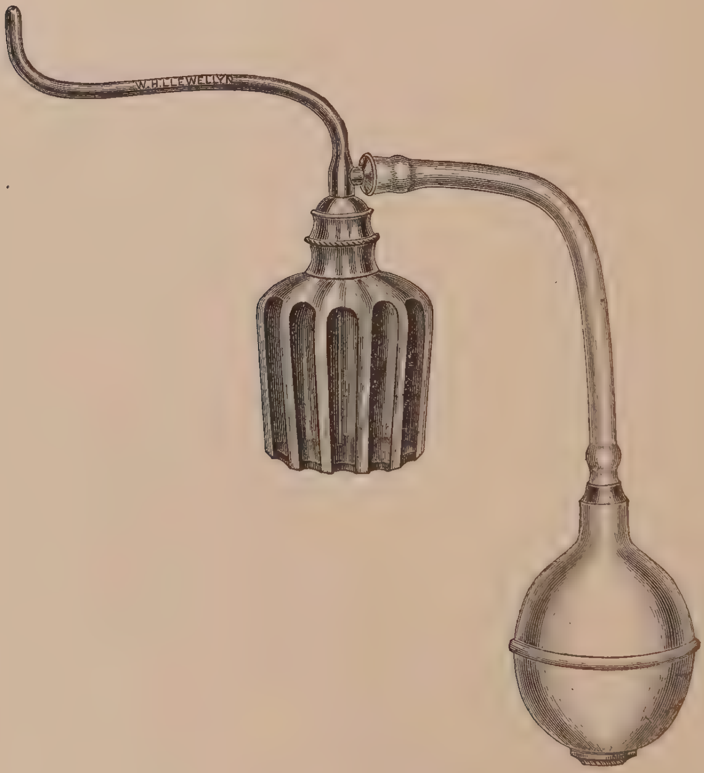
Examination of the parts by means of the rhinoscope generally reveal the presence of masses of secretion of a color and character varying with the stage of the affection, and adhering tenaciously to the walls of the cavity. These being eliminated by means of the atomizer or Hall's syringe (using a solution of bicarbonate of soda, ʒj–Oj), if the membrane is yet in the early stages of the affection, but little, if any difference will be observed, as compared with the normal state; immediately after the cleansing operation, the membrane may appear somewhat congested, but after a short while, this passes away, and the membrane appears even paler than usual. In the second stage, the irregularities of the surface may appear more marked, or the contrary may be the case, the crypts and depressions being filled out, as it were, and appearing as if flush with the surrounding parts. A rough, granular aspect is often presented, the edges of the Eustachian tube openings presenting the same appearance. In advanced cases, the naso-pharyngeal wall generally presents a shrunken appearance, its dry, glistening surface contrasting markedly with the moist appearance of the earlier stages. A sensation of great dryness, which extends to the lower pharynx, is a source of great annoyance to the patient.

Prognosis.—Chronic post-nasal catarrh cannot be considered as dangerous to life in itself, but there is no doubt that its presence so undermines the system as to reduce markedly its resisting power to disease, rendering it susceptible, therefore, to affections to which otherwise it would not be liable. As a focus of inflammation, it is a dangerous neighbor for the surrounding parts, the pharynx, larynx, and the lungs even, being constantly exposed to contamination through continuity of tissue. The disease principally affects young people, frequently disappearing about middle life.

Treatment.—The therapeutic measures to be adopted vary, of course, with the cause of the trouble in each individual case. The cause must first carefully be sought for, and eradicated if possible, the success of the treatment depending upon the effectiveness with which this is accomplished. In other words, turgescences, hypertrophies, polypi, deviated septa, etc., must be cured in order to render a complete recovery possible. Any diathetic condition must also receive attention. The abnormal conditions which may be met with in the anterior nasal cavities have been described; the reader is therefore referred to the chapters containing them for the means to be adopted.

While the treatment for the anterior primary trouble is progressing, the naso-pharynx may also receive attention. Cleanliness is of course an important desideratum, as is the case in all affections accompanied by abnormal secretion. The proper performance of this part of the treatment, however, is not always easy. Ablutions through the nose are not satisfactory; they do not effectively cleanse the naso-pharyngeal membrane of the discharges which adhere tenaciously to them. The cleansing must be conducted posteriorly, the tip of the instrument used being introduced behind the soft palate. The patient must be taught the manipulation, so as to enable him to conduct it several times daily if necessary. In cases in which the discharges are not difficult to remove, the atomizer is the most satisfactory instrument. In my office, I employ Sass' tubes (Fig. 17) which throw a rather coarse spray and cleanse the cavity effectively and rapidly. The straight tips of these instruments, however, prevent their introduction behind the soft palate, and they cannot be used effectively by the patient, the frequent approximation of the velum palati to the pharynx preventing the passage of the spray. The instrument represented in Fig. 60 is the one I usually prescribe for patients, an ordinary perfume atomizer with a long tip curved upward. The patient readily learns how to introduce its point behind the soft palate, the curved end being so rounded as not to wound the soft membrane of the parts. When the crusts are detached with difficulty, Hall's

Fig. 60.



Post-nasal atomizer.

syringe is required, employing as a tube that shown in Fig. 30, which also represents exactly the latter's position in the nose, when used.

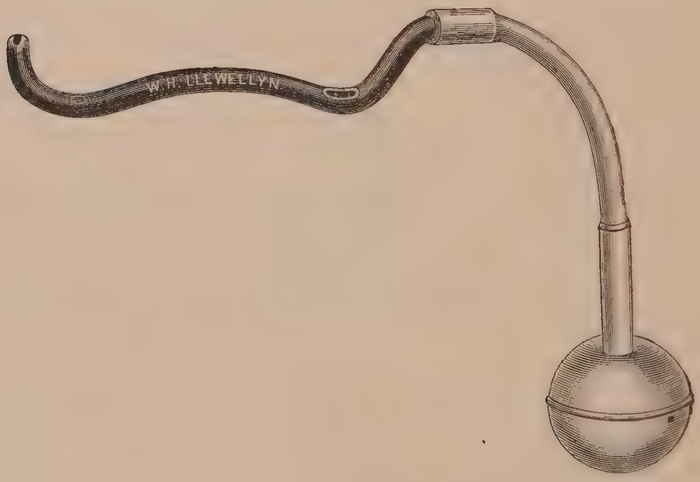
The cleansing solution recommended for anterior nasal affections, pages 75 and 118 having given greater satisfaction than others tried; I also employ them for the naso-pharynx. The first is indicated in the first and second stages of the disease, while the second solution can be employed in the third, when fetor forms an element of the symptoms.

In some cases, the treatment of the primary cause, and the salutary effects of either of the solutions employed in the naso-pharynx, are sufficient, after a period varying from six months to one, two, and occasionally three years, to bring about a comparatively healthy condition of the parts, although relief is experienced from the start. In the majority of cases, however, the treatment must be pushed with more vigor, and local applications in the form of powders, glycerites, or solutions may be used with advantage.

Powders are especially beneficial when the discharge is copious and not inclined to form scabs. When the anterior cavities are large, the auto-insufflator (Fig. 27) can be used most conveniently by the patient, who can, by means of sudden blasts, distribute the powder over the surface of the vault. Few patients, however, have such roomy noses; the majority of cases require an insufflator with which they can medicate the parts through the mouth, and the use of which they can readily learn.

The little instrument shown in Fig. 61 has proven very satisfactory for the purpose. It consists of a hard rubber tube, the tip of which is bent upward and flattened. The other end is also turned upward, to prevent the escape of the powder into the bulb when the instrument is accidentally held perpendicularly; the portion pointing upward is curved and connected with the tube of a rubber bulb. A hole through the upper surface of the tube serves for the introduction of the powder. When the instrument is used, the powder is introduced and the hole is closed with the end of the index finger, the thumb being under. The instrument is then passed into the mouth, the tip introduced behind the soft palate, and a slight compression of the rubber bulb with the left hand, will drive the powder to the desired spot. Patients learn the manipulation without difficulty, although the first two or three trials cause slight retching in some cases. The cheapness of this instrument places it within the reach of even poor patients. For office purposes, when medicines which do not require exact dosage are employed, I use Dr. A. H. Smith's powder insufflator (Fig. 26), using the curved tip.

Fig. 61.



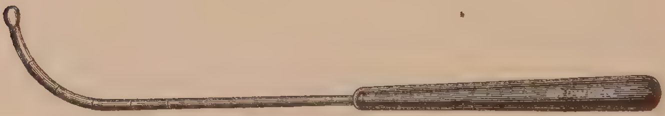
Author's posterior auto-insufflator.

In the early stages of the affection, a powder composed of one-quarter of a grain of nitrate of silver to three grains of bismuth, closely triturated, applied night and morning after cleansing, has proven very effective. After a couple of weeks, the silver nitrate can be increased to one-half grain to the powder. In using this medicine, however, the danger of argyria should be remembered; it is best to cease its use after one month, and resort to some other agent for some time. Oxide of zinc has seemed to me to keep up the action of the nitrate of silver most satisfactorily, one grain being used with three grains of sugar of milk at each application. After one month, the use of the silver can be resumed. Calomel is especially effective when the affection is due to a scrofulous diathesis, one grain with three of bismuth applied twice daily having proven efficient in a number of cases.

When the case has so far progressed that the discharges have become muco-purulent, boracic acid, one grain with as much bismuth, has been found very useful. It modifies the character of the discharge after a few weeks' steady use, after which the treatment for the first stage can be substituted. In some cases, an astringent, such as tannic acid, either used pure or with equal parts of bismuth, exerts a powerful influence upon the membrane, but it cannot be borne by every patient, occasionally increasing the inflammation. In these cases, the addition of powdered belladonna, half a grain to the powder, or one-eighth of a grain of morphia, added to each application, prevents too active stimulation and promotes the absorption of inflammatory products.

In cases in which desiccated crusts are discharged, liquid applications alone should be used, after cleansing the parts very thoroughly. A preparation which has been of great benefit in such cases is the glycerite of carbolized iodotannin, described on page 76. Here, however, it should be used at half strength, four ounces of glycerine being added, instead of two. For its application, the instrument represented in Fig. 62, an appropriately curved wire mounted in a wooden handle, is used. Its tip, which is somewhat roughened, serves for the attachment of a piece of cotton wool. It can be used with facility by the patient, who should be taught the manipulation as it is described page 44. The sulphate of copper solution (gr. iij–℥j) is another valuable agent, which, alternated now and then with the former, sometimes advances markedly the favorable result.

Fig. 62.



Posterior pharyngeal applicator.

Sulphate of zinc (gr. v–℥j), acetate of lead (gr. v–℥j) or chloride of zinc (gr. iij–℥j) may also be used advantageously, according to indications. Warm vaseline administered with the atomizer, strongly recommended by Glasgow, of St. Louis, has also proven satisfactory in my hands.

In the majority of cases of aggravated post-nasal catarrh, internal treatment is of the greatest importance. When scrofula is an element of the trouble, syrup of the iodide of iron, administered as in scrofulous rhinitis, syrup of the hypophosphites, or tonic doses of bichloride of mercury (gr. $\frac{1}{48}$), iron, quinine, and strychnia, may be used, according to the necessities of the case. The hydrated chloride of calcium, ten or more grains three times daily, as recommended by Cohen, has given excellent results in a number of cases.

Agents which are partly eliminated through the glands of the throat and nose, when taken internally, are sometimes very serviceable in assisting the curative measures by modifying the character of the discharges. Of these, cubebs is, in my opinion, the most effective. It may be administered in the form of powder, three grains being given in syrup of ginger and water, after meals; or, the oleosin may be employed, fifteen drops on a lump of sugar also three times a day and after meals.

Ammoniacum in very small doses (gr. j.–iij) is much lauded by Beverly Robinson, administered with an expectorant such as ipecac or carbonate of ammonia. In cases in which the stomach rebels against cubebs, it may be used as an excellent substitute.

The presence of malaria in the system interferes greatly with the progress of the case, apparently neutralizing the therapeutic measures. The exhibition of quinine is of course indicated, and should be continued until all traces of the malaria have completely disappeared.

HYPERTROPHIC POSTERIOR NASAL PHARYNGITIS.

(Synonyms:—Adenoid Vegetations at the Vault of the Pharynx; Adenomata of the Pharynx.)

Etiology.—Hypertrophy of the glandular tissue of the naso-pharynx occurs principally in childhood and adolescence. It is seldom seen after the age of thirty, and does not seem to be due to any special diathesis, although, as shown by Löwenberg, a lymphatic temperament seems to predispose to it. The origin is probably traceable in all cases to a catarrhal state of the naso-pharynx, the causes of the latter being therefore the primary etiological factors. Heredity is undoubtedly an element in many cases. In this country, it seems to be oftener prevalent among females than males.

Pathology.—The analogy between the glandular tissue of the vault of the pharynx and the tonsils, which caused Luschka to term the former the "pharyngeal tonsil," renders it probable that the liability to hypertrophic changes to which the tonsils are susceptible in some persons, exists also in the pharyngeal tonsil, and that a continued or often repeated inflammatory process may also act as an exciting cause. The inherent deficiency of recuperative powers peculiar to lymphatic glandular tissue being an important element in the pathology of this, as it is in simple chronic inflammation, the hypertrophic process is but a result of the continued hyperplasia. Microscopically, the growths consist mainly of the adenoid tissue of His, which contains quantities of lymph cells, some conglomerate glands and follicles, and is freely supplied with blood-vessels.

Symptoms.—The most prominent symptom of glandular hyperplasia is due to the interference with the passage of the sound waves through the posterior nasal cavity which the growth occasions. It consists of a peculiar deadness of the voice, a want of resonance which causes it to sound as if the words were spoken into a tumbler held horizontally with its rim close to the mouth. This muffled condition of the voice is accompanied with a nasal intonation, resembling somewhat the "nasal twang" but it is deprived of the ringing character which the latter sometimes possesses; the patient is said to talk "thick." As a rule, the nasal respiration is not impeded, but when the growths are large, a feeling of obstruction is experienced, especially marked during inspiration, and when an accumulation of mucus diminishes the lumen of the cavity. When the growths are very large, however, respiration through the nose is rendered difficult, and the patient is obliged to breathe through the mouth, to the detriment of the pharynx and larynx.

The discharge is not, as a rule, as important an element of the case as in simple posterior chronic nasal pharyngitis. It is usually that described when speaking of the first stage of the latter affection, a thick, whitish, gluey substance, which is sometimes tinged with blood. Occasionally, it assumes a purulent character, and scabs are formed which desiccate *in situ*, and are usually "hacked" into the mouth and expectorated, leaving the underlying surface somewhat abraded, with a tendency to bleed. Aural complications are frequently present, due in some cases to pressure upon or occlusion of the mouth of the Eustachian tubes, and in others to extension of the catarrhal inflammation into them.

The appearances of the growths vary greatly in different cases. In some they resemble a cushion, extending from the posterior nares along the roof and upper part of the naso-pharynx to within a short distance above the level of the soft palate, more or less deep crypts and depressions rendering its surface irregular. In others they present the form of rounded bodies resembling small pink beans, which hang in clusters from the roof of the cavity and hide from view the upper portion of the posterior nares. Frequently the mass is greater on one side of the cavity than on the other, and is sometimes sufficiently large to press upon the mouths of the Eustachian tubes and even to obliterate their openings. Their color is light pink, which becomes red when subjected to manipulation with the probe, or by the use of cleansing solutions.

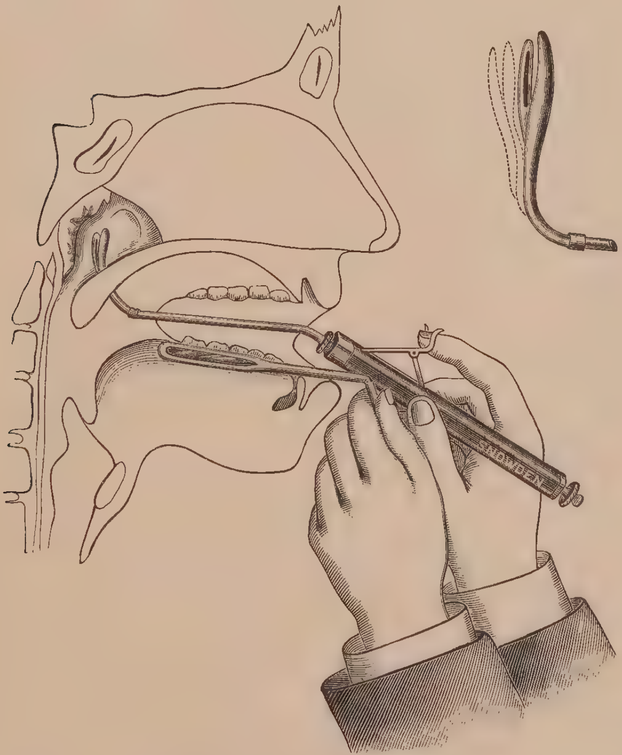
When the rhinoscope cannot be used, as in children for instance, the examination can be conducted with the index finger passed behind the soft palate. As indicated by Meyer, of Copenhagen, the sensation communicated to the finger when the grape-like or fimbriated variety is met with, is that experienced when the finger is applied to a mass of earth-worms. In the cushion-like variety, a soft, smooth surface is felt, which contrasts with the comparative hardness of the surrounding parts.

Prognosis.—The natural tendency of these growths is to undergo absorption towards the thirtieth year. Left to themselves, therefore, they will gradually disappear. Although this may seem to render therapeutic measures unnecessary, the impaired enunciation and the danger to the hearing, besides other complications which might arise, are sufficient to warrant the employment of active treatment.

Treatment.—Removal of the growths by surgical means is the only effective procedure. When the vegetations are not large, galvano-cautery may be used with advantage. A suitably bent electrode, with a small loop presenting a burning surface about as large as a pea and covered by a hood, to prevent burning of the surrounding parts, is passed behind the soft palate and located against the most prominent portion of the growth. The current being then turned on, the white-hot metal is left in contact with the mass a couple of seconds. The electrode is then moved slightly, and another cauterization is applied, this procedure being repeated three or four times, without removing the instrument. Slight bleeding generally follows the operation, which is painless and not followed by disagreeable after-effects. After a few days, it can be renewed until the exuberant tissue has been destroyed.

The instrument represented in Fig. 44, used with the curved tip, is very convenient for the extirpation of large growths by snaring. Introduced with the loop hidden in the tube, the tip is placed behind the mass which is to be cut off. The loop being then formed by separating the rings, it encircles the mass, which can then either be gradually or suddenly cut off. The operation presents the advantages of being easily performed and of being absolutely free from all danger. For suitable cases, the straight end may be used by passing it through the anterior nares. It is only applicable, however, in the fimbriated variety of vegetations, the cushion-like masses not being seizable by

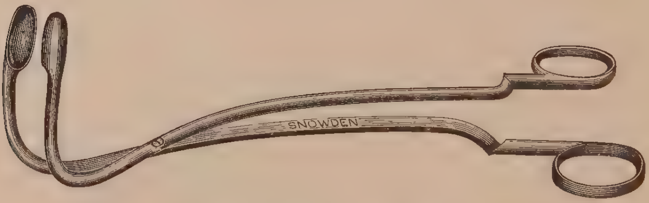
Fig. 63.



Author's post-nasal cautery loop in position.

the loop. The cautery snare can also be used, but the proximity of the Eustachian tubes renders its use more dangerous than other less complicated methods. The instrument shown in Fig. 64 can be used with advantage in any case, but its manipulation requires care. The extremities of the blades are cup-shaped and sharp, and when they are introduced into the vault, the part seized is cut off. In pillow-like vegetations the sharp end is pressed into the mass, and when the blades are approximated, a piece is pared off, leaving a deep furrow. Considerable bleeding follows in some cases, but this stops after a few moments. Fimbriated tumors can be grasped with ease, and generally bleed but slightly if at all. The rhinoscope should always be used to guide the instrument. Several operations are necessary, at five or six days' interval.

Fig. 64.



Cohen's post-nasal cutting forceps.

Guye, of Amsterdam, uses his finger-nails to scrape the growths away, a method which presents advantages in children. Capart, of Brussels, uses a curette, connected with the end of the finger by means of a double cylinder, which also acts as a finger shield.

NASO-PHARYNGEAL POLYPUS

Etiology.—Polypi located in the naso-pharynx are rarely met with. They usually occur between the ages of five and twenty-five, and are more frequently developed in males than females. Morell Mackenzie believes them to be due "to an irregular evolution, during the growing period, of a tissue which, under normal conditions, is exceptionally abundant on the under surface of the base of the skull;" a fact rendered probable by the predilection of the growths for the time of life during which development takes place, and their tendency to spontaneous absorption after the development has been accomplished.

Pathology.—Naso-pharyngeal polypi, like the fibrous growths occurring in the anterior nasal cavities, arise from the periosteum or from connective tissue, and present the same pathological characters as similar growths in other situations: fibrous tissue, closely interlaced or grouped in bundles of various sizes, interspersed with small vessels whose coats are easily torn.

Symptoms.—The early symptoms of naso-pharyngeal polypus are those of an advanced case of adenoid vegetations in the naso-pharynx, just described—more or less embarrassed nasal respiration, nasal voice and profuse mucoid discharges. As the case progresses, the symptoms become more accentuated until respiration through the nose becomes impossible, and the voice so altered as to be almost unintelligible. The discharge increases in quantity and is frequently sanguinolent, the blood arising not only from the tumor itself, but also from the surrounding parts, which are compressed. If the polypus grows downward, deglutition becomes difficult, and nausea, cough, shooting pains in different parts of the head and chest may occur through reflex irritation. When the polypus advances toward the anterior cavities, hearing soon becomes impaired through pressure upon the Eustachian orifices, and frequent cephalalgia, especially located on the top of the head, is complained of. As the tumor grows, it penetrates into the nearest cavity, making room for itself by displacing and destroying bone and cartilage through pressure, sometimes sending prolongations on all sides, and distorting the features fearfully in some cases; the more frequent disfigurement is a separation of the nasal bones, which induces the characteristic "frog face." Fibrous polypi are dark pink or red, and usually covered by a network of vessels which grow larger as they approach the seat of implantation. They are usually attached by a moderately broad base, the diameter of which is that of the growth for some distance. They are hard and resisting.

Prognosis.—A naso-pharyngeal polypus growing after the twentieth year, is not likely to attain sufficient size to cause a fatal issue. As the process of growth ceases, that of the tumor ceases also, and it may even be completely absorbed. Earlier in life, if left to itself, the growth steadily increases until the patient succumbs.

Treatment.—If seen early the evulsion of a naso-pharyngeal polypus cannot be said to be difficult. The hardness of the mass and its tendency to copious bleeding when lacerated, preclude the use of the forceps, although these are used by some surgeons, who employ a strong, curved instrument which is passed behind the soft palate. The snare, galvanic or cold, is in my opinion the best instrument at our disposal. If sufficient time be taken for the operation, but little if any blood is lost, and the pain to which the patient is subjected is trifling, while cocaine, applied thoroughly to the parts, renders the operation painless. A curved canula is required if the operation is to be performed through the mouth, while the ordinary straight tube can be used through the nasal cavities. The selection of either depends, of course, upon the position of the tumor and its shape. When the polypus grows from the roof of the cavity and hangs downward, the operation is best performed through the nose, the loop being adjusted as near as possible to the seat of implantation by a finger passed behind the soft palate, and held there until firm grasp is obtained. One hour at least, should be employed to gradually penetrate the growth if the cold snare is used, while somewhat less time is needed with the cautery snare, which cauterizes the cut surface. When the tumor grows upon the posterior surface of the vault, pointing towards the posterior nares, the operation through the mouth will alone enable the loop to sever it close to its point of attachment. Here, again, the finger should be used to apply the wire to the proper position. When the growth is sessile and cannot be grasped, a curved transfixing needle can be passed through it, its introduction being conducted with the assistance of the rhinoscope.

When the polypus is almost penetrated by the loop, it should be secured with a curved volcella forceps, to prevent its falling into the larynx when detached. Large growths with numerous attachments require more space than the natural openings for their extirpation, and either of the operations of Rouge or Ollier, which have already been alluded to, may be required; or, the soft palate may be divided and the hard palate trephined, as practiced by Nélaton. Other operations of even greater magnitude have sometimes to be resorted to.

Electrolysis has occasionally succeeded in destroying naso-pharyngeal polypi. Cohen's needle, which is covered by a non-conducting material, is the most convenient instrument for the purpose. It should be connected with the negative pole of a moderately strong battery, the positive pole being placed over the sternum. Each application should be renewed every other day, the sittings lasting from ten minutes to one-half hour.

Injections of iodine or ergotine may be used to encourage absorption, or actual cautery or caustic acids may be employed to induce suppuration and shrinkage.

PLATE V.

PLATE V.

Figure 1.—Male, æt. 21; anterior view of extensive osteo-enchondroma of septum, occluding completely left nasal cavity; mass reduced with dental engine. Case referred by Dr. C. S. Turnbull.

Figure 2.—Lateral view of above.

Figure 3.—Male, æt. 24; posterior view of assymetrical nasal cavities of above case; complete stenosis of the left narium.

Figure 4.—Male, æt. 44; anterior view of deviation of septum to right, causing partial occlusion of cavity. Case referred by Dr. M. O'Hara.

Figure 5.—Lateral view of above, showing concavity of septum anteriorly, and a convexity posteriorly, due to abnormal thickness of the septum.

Figure 6.—Posterior view of above, showing the thickened septum pressing on left middle and inferior turbinated bodies, causing asthma. Thickness reduced with surgical engine, passing burr under the mucous membrane; asthma relieved.

Figure 7.—Male, æt. 48; relaxation of soft palate, causing symptoms of elongated uvula; astringents found useless; amputation of uvula.

Figure 8.—Female, æt. 22; elongation of uvula, causing cough, expectoration, etc., and general symptoms of phthisis; amputation; complete relief.

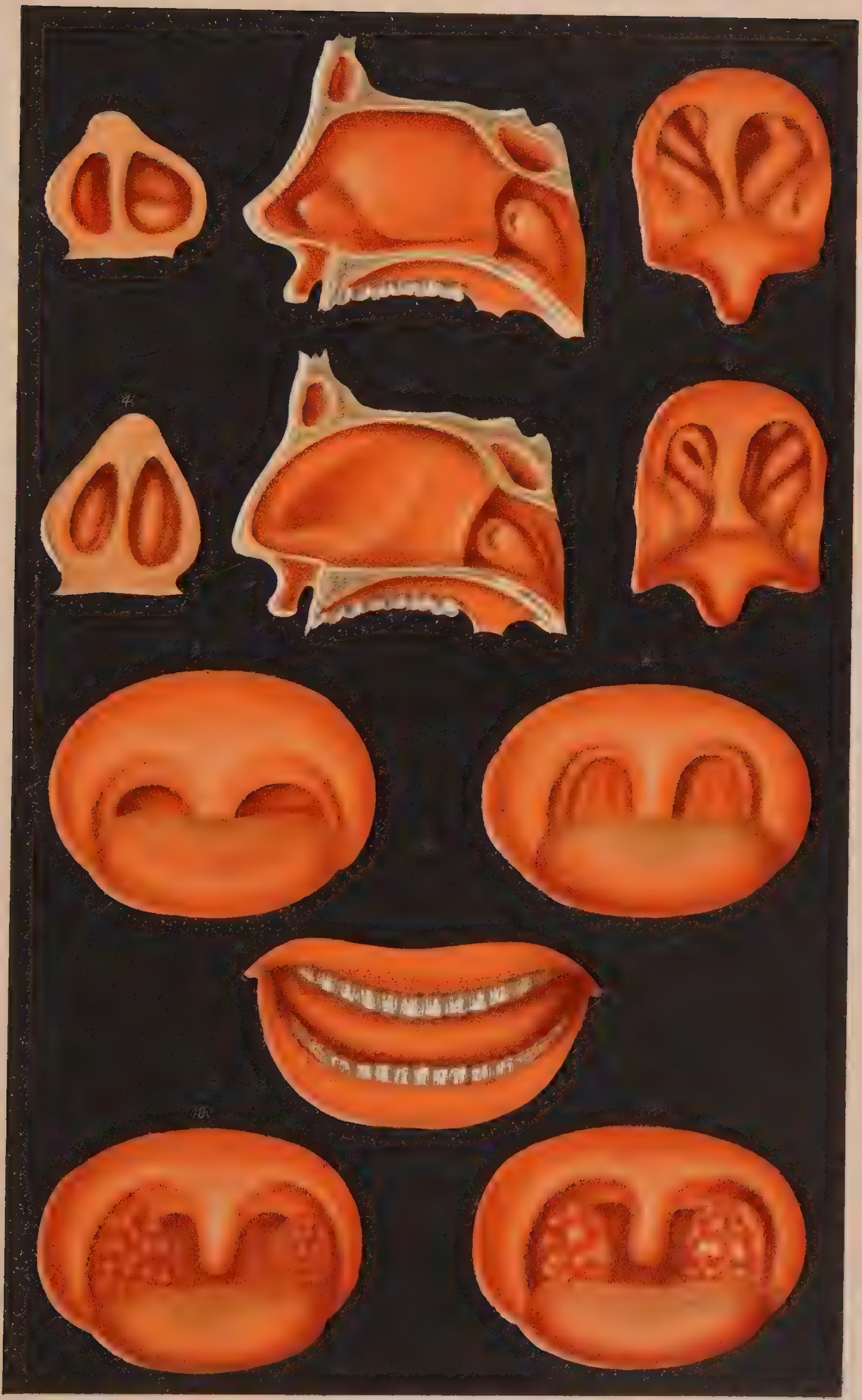
Figure 9.—Female, æt. 27.—Position of mouth in forcible separation of jaws during tonsillitis; further examination impossible; diagnosis established by character of pain, color of tongue, odor of breath, and odynphagia.

Figure 10.—Male, æt. 28; hypertrophy of the tonsils; amputation with tonsillotome.

Figure 11.—Appearance of tonsils in above case during an attack of tonsillitis.

[Note.—Represented as seen by gas-light. By day-light, the red color appears much paler.]

Plate V.



C. E. Sajous, Pinxit

Burk & M^c Fetridge, Lith. Phila.

CHAPTER XIII.

ANATOMY AND PHYSIOLOGY OF THE PHARYNX.

ANATOMY.

THE PHARYNX.

As generally considered, the pharynx is that portion of the pharyngeal cavity situated between the naso-pharynx, or posterior nasal cavity, which extends to the level of the soft palate above, and the laryngo-pharynx, which begins on a plane with the greater cornua of the hyoid bone and extends to the lower border of the cricoid cartilage below. In contra-distinction to the naso-pharynx and the laryngo-pharynx, it is sometimes called the *oro-pharynx.* In the adult it extends about two inches perpendicularly and presents to the eye of the observer a more or less concave surface, with a slight central and perpendicular convexity, well marked in aged individuals. Its breadth is about one and a half inches. The *side* of the pharynx is connected with the posterior half arch, which extends from the posterior aspect of the soft palate on each side, and is formed by the fold of mucous membrane covering the palato-pharyngeus muscle. These folds are sometimes called the *posterior pillars* of the fauces, on account of their resemblance to the pillars of an archway, and in contra-distinction to the *anterior pillars* or anterior half arch, or palato-glossal folds, which are formed by the palato-glossus muscle, and extend from the anterior aspect of the soft palate to the side of the tongue.

The *mucous membrane* lining the pharynx proper adheres closely to the constrictor muscles, which in turn are separated from the cervical vertebra and the strong aponeurosis which covers them, by cellular tissue. Laterally, it overlies the carotids and the internal jugular veins, the pneumogastric and eighth pair of nerves, lymphatics, and ganglia. Its *epithelium* is of the squamous variety, and compound follicular glands are distributed over its surface.

Vessels.—The arteries which supply the pharynx are derived from the ascending pharyngeal branch of the external carotid, and the ascending palatine branch of the facial artery. A few twigs from the internal maxillary may also be found.

Nerves.—The nervous supply is derived from the pharyngeal plexus and branches of the pneumogastric nerves and the spheno-palatine ganglion.

THE SOFT PALATE.

The soft palate, or velum pendulum palati, is a movable, curtain-like musculo-membranous fold suspended from the posterior border of the hard palate. During nasal respiration it stands some distance from the pharynx, and the interval between it and the latter is termed the isthmus, already alluded to. Its border, which hangs free across and above the base of the tongue, forms the upper part of the arch, and is subdivided into two smaller archways (the anterior and posterior pillars already described) by the *uvula*, a nipple-like protuberance suspended in the middle, and possessing also free mobility.

The soft palate is connected with the surrounding parts by means of the tensor palati, levator palati, palato-glossi and palato-pharyngeus muscles, and is covered anteriorly and posteriorly by mucous membrane. Its anterior surface is freely supplied with racemose glands. The uvula contains the azygos uvulæ muscle which draws it up to completely close the isthmus, and is also covered by a comparatively thick layer of mucous membrane.

THE TONSILS.

The tonsils are two almond-shaped bodies lying between the anterior and posterior pillars, one on each side. Each tonsil is about nine lines long and six lines wide, and its thickness is usually so limited in the normal condition as to render its examination very difficult. Its surface, which is invested with pavement epithelium, is studded with from twelve to fifteen depressions, the *lacunæ*, which penetrate deeply into the surface of the gland, and are covered by reduplications of the mucous membrane, thickly furnished with follicles. In the spaces between them are quantities of small lymphatic glands. The tonsil is in relation externally with the superior constrictor muscle, behind which lies the external carotid artery, from which it receives a branch, sometimes quite large, the tonsillar artery.

Physiology.—The physiological functions of the oro-pharynx are principally concerned in the process of deglutition. The contraction of the constrictor muscles, underneath, propels the bolus down in the direction of the œsophagus, while the follicular glands serve to lubricate it so as to facilitate its passage to the stomach.

The soft palate acts as a valve which closes the isthmus tightly during deglutition, to prevent the ascent of the bolus of food into the posterior nasal cavity. In phonation, it also holds an important position, its proximity to the pharynx giving or depriving the voice of nasal intonation (see page 21). The uvula serves the purpose of closing up tightly what interval might exist between the edge of the soft palate and the pharynx, when the former is raised and adapted against the latter.

CHAPTER XIV.

PHARYNGOSCOPY.

PHARYNGOSCOPY is the term applied to the optical examination of the pharynx. The mouth being widely opened and the light directed into it, the part which will appear, if respiration is continued as it was before the mouth was opened, *i.e.*, through the nose, will be the anterior surface of the soft palate, its lower border, including the uvula, being closely adapted against the base of the tongue, so as to form a direct channel for the passage of the air current on its way from and to the lungs, behind. If now the tongue is depressed with a tongue-depressor such as that shown in Fig. 11, the edge of the soft palate will cease to touch the base of the tongue (unless the former be elongated) and the patient will breathe partly through the mouth and partly through the nose. The soft palate will appear in full view, its light pink color contrasting somewhat with the redder aspect of the pillars and the posterior walls of the pharynx, which, however, can only partly be seen. If the patient is now directed to breathe forcibly through the mouth, the soft palate will be seen to rise and adapt itself closely to that part of the pharynx which may be considered as the dividing line between the naso-pharynx and the oro-pharynx. The latter will then appear, bounded above by the outline of the soft palate, laterally by the posterior pillars, and below by the base of the tongue. In the normal state, the pharynx is pinkish, streaked with patches of a lighter hue. Thin blood-vessels may be seen crossing it from side to side or obliquely, while its surface is studded with minute monticules about the size of a pin's head, formed by the underlying glands. The anterior and posterior pillars, when normal, should appear sharply defined, and be of a pale-yellowish pink hue. The uvula is of the same color.

The tonsils are usually seen with difficulty when they are not hypertrophied. When they are visible, their upper half only can generally be brought to view, the lower half being below the level of the tongue. Their surface is irregular and marked by a number of depressions, the lacunæ or crypts.

CHAPTER XV.

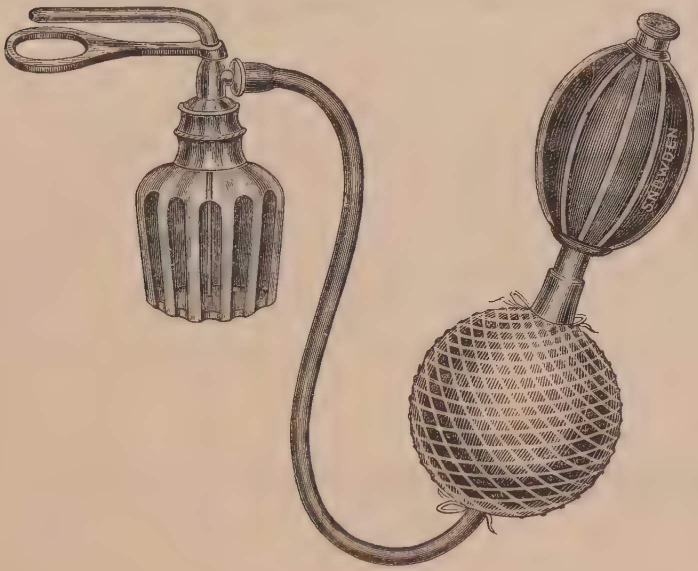
INSTRUMENTS USED IN CLEANSING AND MEDICATING THE PHARYNX.

Cleansing of the pharynx, soft palate and tonsils, prior to the application of remedies, is almost as important as in the nose. The most effective instrument for office use is Sass' direct tube (Fig. 17), the pneumatic power being furnished by an air compressor (Fig. 18). In order to expose the pharynx to the spray, the tongue must be depressed, the tongue depressor being held with the left hand while the Sass tube is held with the right. Two-thirds of the tongue being depressed, the patient is directed to breathe entirely through the mouth during the application, so as to force the soft palate upward, and expose as much as possible of the pharynx and its adjacent parts. The surfaces having been thoroughly irrigated, a large piece of absorbent cotton, held in the grasp of a forceps, can be used to mop the moisture from the membrane, the medicinal application being made immediately after.

When the patient has to be entrusted with the local treatment of the parts, an atomizer is required which can be manipulated easily and independently of an air condenser. The hand and ball arrangement is here most convenient, but as one hand is required to operate the rubber bulb and the other to hold the bottle, an arrangement such as that shown in Fig. 65, in which the tongue-depressor is connected with the atomizer, becomes necessary. The apparatus generally sold, in which the spray tube is in contact with the tongue-depressor, should not be employed; it gags the patient if introduced deeply into the mouth, and if it is not, the spray impinges upon the portion of the tongue beyond the tongue-depressor, and does not reach the pharynx.

For the application of solutions to limited portions of the pharyngeal cavity, the cotton pledget and the brush are mostly employed. For cotton pledgets, the instrument shown in Fig. 66, is, in my opinion, the most satisfactory in every way. Its grasp is very safe, while the simplicity of its construction renders its cleansing easy.

Fig. 65.

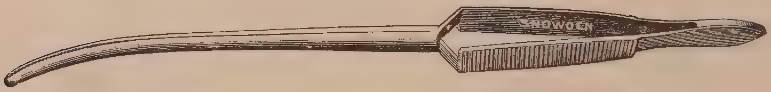


Author's pharyngeal atomizer.

For the patient's use, the instrument represented in Fig. 67 can be recommended on account of its simplicity and slight cost. He should be carefully shown its mechanism and directed to bring the clasp ring as closely to the end as possible, when the cotton pledget, made as described on page 45,-has been inserted between the claws.

The brush, however, is to be preferred when the applications have to be made by the patient. It should be flat, about one-half inch in width, and examined before each application, to ascertain that no loose hair is likely to become detached and cause annoying symptoms, such as cough, nausea, etc.

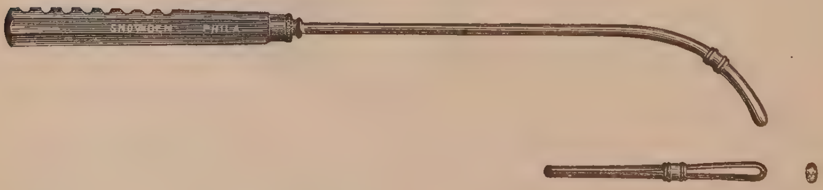
Fig. 66.



Cohen's pharyngeal cotton holder.

In making an application to the pharynx with the pledget or brush, care should be exercised to not take up too great a quantity of the fluid used. It this precaution is not observed the solution is liable to run down along the pharyngeal wall to the larynx, where it may cause spasmodic cough and irritation, followed by annoying sensations of some duration. The applications are best made from below upward, a horizontal line being first drawn across the lower limit of the application, to arrest any rivulet of the solution that may form above, through the compression exerted by the instrument against the surfaces treated.

Fig. 67.



Turnbull's cotton holder.

For the application of powders, the scoop insufflator (Fig. 25) or Dr. A. H. Smith's instrument (Fig. 26), may be employed, the straight tip being adjusted. While applying powders in this locality, the bulb of the insufflator used should be compressed lightly and repeatedly, the application being divided into a series of light puffs, which, combined, cover the entire surface. The patient should be directed to breathe through his mouth during the application, and to avoid swallowing some time after, so as to insure the dissolution of the powders *in situ.* Inhalations of medicated steam are very useful in affections of the pharynx and tonsils. The inhaler shown in Fig. 28, the low cost of which places it within the reach of even poor patients, may be used, or a more complicated instrument, such as the steam atomizer, represented in the chapter on "instruments used in treating diseases of the laryngeal cavity," which projects the medicated steam through the horizontal glass funnel shown, may be employed.

CHAPTER XVI.

THERAPEUTICS OF THE PHARYNX.

As stated in Chapter XV, cleansing of the pharynx and the adjacent parts prior to the application of remedies, is almost as important as in the nose. It enables the medicament to come in direct contact with the diseased surfaces, this being further assisted by drying the latter with absorbent cotton immediately before each application. If these precautions are neglected, the secretions reduce the strength of the solution used, if the former are thin and watery, while the medicinal agent does not reach the part at all if the discharge is thick, its density preventing the contact of the solution and all action upon the underlying membrane.

Gargling is sometimes effective in cleansing the posterior oral cavity of superabundant healthy or unhealthy secretions; but as generally practiced, this operation is very ineffectual when the posterior wall of the pharynx is to be reached. As usually done, a mouthful of the solution used being taken into the mouth, the head is thrown backward, and the fluid gravitates no farther than the soft palate; this adapts itself closely to the base of the tongue, while a current of air, which passes through a slit between them, is forced through the liquid, producing the gurgling noise heard. In diseases of the soft palate and tonsils, much benefit sometimes follows this popular way of gargling, through the fact that the latter are rotated forward while the gargling is performed; but when the disease implicates the pharyngeal wall, the latter being completely closed off, no benefit whatever is procured. Properly conducted, gargling is productive of excellent results. The patient having thrown his head backward, should partially swallow the liquid, *i.e.*, arrest it just as the act is to be completed, and air being allowed to pass through it (as in the ordinary method) for a few seconds, to prevent the second movement of deglutition, the head is suddenly tilted forward, causing the fluid to regurgitate into the mouth. After a few trials the patient will generally succeed in gargling effectively. As to the agents to be employed in gargles, they should be limited to those which, if accidentally swallowed, would cause no deleterious effects.

The cleansing solutions described on page 53 can be used for the pharyngeal cavity as well as for the nose, none of them possessing sufficient medicinal activity to even disturb the stomach in the one dose. The bicarbonate of sodium and the biborate of sodium solutions are in my opinion more effective than the others. To them may be added chlorate of potassium (ʒj–Oj) which, in acute troubles especially, is invaluable.

Medication.—The agents employed in the treatment of the pharynx do not differ from those employed in the nasal cavities. The reader is therefore referred to the chapter on the therapeutics of these parts for their enumeration and a detailed account of their properties.

CHAPTER XVII.

DISEASES OF THE PHARYNX.

ACUTE PHARYNGITIS.

(Synonyms: Acute Sore Throat; Acute Catarrh of the Pharynx; Angina Catarrhalis.)

Etiology.—Exposure to cold or damp is the most frequent cause of acute pharyngitis, especially in persons in whom in-door life and sedentary habits have diminished the resisting power against external influences. Rheumatism and syphilis, a scrofulous diathesis, and a liability to herpetic eruptions, predispose to it, while prolonged treatment with debilitating agents such as mercury, iodide of potassium and alkalies in general, seems to exert some influence in rendering the pharynx liable to the disease. It may occur as a complication of an inflammatory process in an adjoining part, such as acute rhinitis, tonsillitis, etc. It is most frequent in young people, although it frequently occurs in old age.

Pathology.—The brunt of the inflammatory process is not, as usual, evenly distributed, being greater in some parts of the membrane than in others. It principally involves the glandular structures, their action being interfered with by the engorged blood-vessels. After a time the glands become over-stimulated and their secretion much increased and starchy, this process retrograding as the disease disappears.

Symptoms.—In the majority of cases of acute pharyngitis, the general symptoms are so slight that they are hardly perceived, a feeling of lassitude, slight headache, and superficial heat, being the usual train of sensations experienced. The local symptoms are more marked, however. At first a feeling of dryness and stiffness, most marked when deglutition is performed, is noticed, these symptoms increasing until pain becomes, sometimes, quite severe. As a rule the voice is veiled, and a feeling as if a foreign body were there causes the patient to hawk frequently. After a few days the expectoration increases, a thick mucus taking the place of the normal secretion. In severe cases, the systemic disturbance is much greater; a chill marks the onset of the attack, and high temperature, reaching as high as 103° Fahr., is present. The local inflammation being greater in proportion, deglutition is very painful, and all the symptoms are proportionately more severe. In these cases, extension of the inflammation to the laryngeal cavity becomes a formidable complication, there being danger of œdema and death. The cervical glands are often swollen and painful to the touch.

Examination of the pharynx reveals an irregularly distributed redness, or patches of congestion implicating, in the majority of cases, the posterior pillars and the posterior aspect of the soft palate. Dilated blood-vessels may be seen coursing over the inflamed surfaces, while slight elevations mark the seat of the inflamed follicles. In severe cases, the anterior pillars, the uvula and the tonsils are also involved, the redness being greater and more evenly distributed. The tongue is generally furred when the affection is severe.

Prognosis.—In the great majority of cases, the affection lasts but six or seven days, but it usually leaves the parts weakened and subject to renewed attacks. Death, although occurring exceedingly rarely, may follow a very severe attack through extension of the inflammatory process to the larynx.

Treatment.—The introduction of cocaine has added a valuable agent to our list of remedies for the treatment of this affection. A four per cent. solution applied every two hours with a brush, after having cleansed the parts with chlorate of potassium solution and dried them, has several times succeeded in cutting an attack short in six or seven hours. Wine of coca, given internally, a wineglassful every two hours, also assists materially in hastening resolution. Coca lozenges, each containing five grains, may replace the wine when the latter cannot conveniently be taken. These preparations induce contraction of the vessels of the membrane, thus relieving the engorgement. When they cannot be procured, the next best remedy is perhaps opium, which also stimulates the vaso-motors when taken in small doses; three to five drops of the tincture being given every hour three times, then every two hours. Tincture of belladonna, two drops taken in the same manner, can be administered instead when an idiosyncrasy prevents the use of opium. Guaiac is also a valuable preparation, internally as well as locally, especially when the affection occurs in a rheumatic individual. One drachm in a half glassful of milk, used as a gargle and swallowed every three hours, generally succeeds in arresting an attack after three or four doses. It may also be administered in conjunction with steam, a drachm being placed in a teacupful of hot water. The cup being covered with a towel folded into a cone, the mouth is placed over the upper opening, and the steam is inhaled as long as it is generated. The inhaler (Fig. 28) may be used with advantage.

When the affection is due to hepatic engorgement, a saline purgative is, of course, of primary importance, followed with phosphate of sodium, a teaspoonful night and morning for a few weeks, which acts as a gentle stimulant to the liver.

PLATE VI.

PLATE VI.

Figure 1.—Male, æt. 23; acute pharyngitis; saline purgatives; wine of coca; two per cent. spray of cocaine.

Figure 2.—Male, æt. 44; simple chronic pharyngitis; mild purgation every other day, using podophyllin; nitrate of silver solution (gr lx–℥j) three times per week, alternating every other week with copper sulph. (gr. x–℥j) solution. Case referred by Dr. Weaver, of Norristown.

Figure 3.—Male, æt. 21; folliculous pharyngitis; galvano-cautery to follicles. followed by application of copper sulph. sol. (gr. v–℥j); attention to stomach and bowels. Case referred by Professor S. W. Gross.

Figure 4.—Male, æt. 67; atrophic or dry pharyngitis; nitrate of silver sol. (gr. x–℥j) daily; oleo-resin of cubebs internally.

Figure 5.—Normal appearance of pharynx, uvula and palatal folds—

e, Soft palate.
f, Uvula.
n, Posterior wall of pharynx.
o, Posterior pillar.
p, Anterior pillar.

Figure 6.—Male, æt. 23; tuberculosis of pharynx; morphia insufflations; cocaine (not known at that time) would now be used. Case referred by Professor William H. Pancoast.

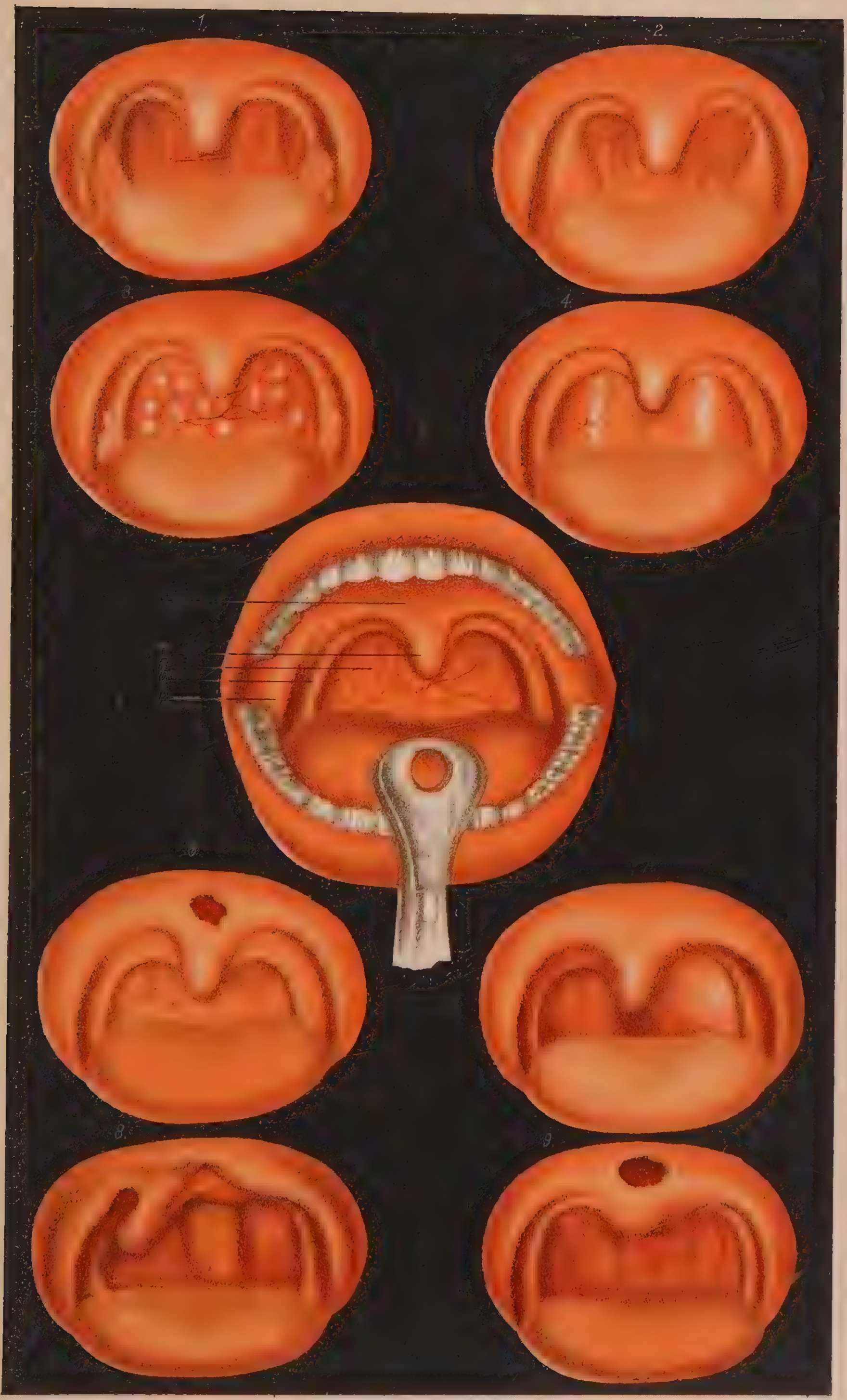
Figure 7.—Male, æt. 28; retro-pharyngeal abscess; abscess opened. Case referred by Dr. L. Webster Fox.

Figure 8.—Male, æt 29; syphilitic ulceration of pharynx and soft palate; mercury and iodide of potassium; local applications of iodoform and morphia; afterwards cauterized with mitigated stick.

Figure 9.—Male, æt. 20; adhesion of soft palate to posterior wall of pharynx, following syphilitic ulceration; perforation of soft palate, enabling patient to breathe through the nose.

[Note —Represented as seen by gas-light. By day-light, the red color appears much paler.]

Plate VI.



C.E. Sajous, Pinxit

Burk & McFetridge, Lith. Phila.

SIMPLE CHRONIC PHARYNGITIS.

(Synonyms:—Chronic Catarrh of the Throat; Chronic Sore Throat; Relaxed Throat.)

Etiology.—Repeated attacks of acute pharyngitis are the most prolific factors in the production of simple chronic pharyngitis. The causes of the former are therefore those of the latter. In addition to these, however, may be added alcoholism and debauchery, prolonged exposure to dry heat, the constant inhalation of smoke and inordinate smoking, a disturbed state of the digestive apparatus, and hepatic torpidity. Posterior nasal pharyngitis is also a frequent cause, through extension of the inflammatory process from above downward, or to the contact of the secretions which descend from the diseased surfaces.

Pathology.—As is the case in chronic rhinitis, frequent inflammatory manifestations, whether due to cold or to other causes, gradually reduce to permanency the abnormal condition of the vascular supply accompanying an acute attack. Here, however, the membrane yields to the expanding action of the congestion, and after frequent repetition of the inflammatory process, it does not return to its normal position over the underlying tissues, but remains swollen, falling back in folds. When an acute attack (which now represents an exacerbation of the disease) has subsided, the glandular elements, being over-stimulated, pour out an excess of secretion, its character depending upon the gravity and duration of the affection.

Symptoms.—The symptoms of the affection are more than prone to manifest themselves by exacerbations than as continued suffering. Dryness and parchedness, relieved momentarily by a sip of water or other beverage, is usually the first source of annoyance, culminating in a spicy and raw sensation extending in some cases to the vault. The voice is usually somewhat hoarse and lowered in pitch, and is easily tired. Frequent hacking and coughing is indulged in to clear the throat of accumulated masses of thick, tenacious mucus, which are sometimes tinged with pus or blood. After a few days, these symptoms become somewhat less severe, a stage of comparative comfort being enjoyed until another slight exposure or imprudence, a day's constipation or an injudicious meal, bring on another exacerbation.

The membrane may or may not seem congested, but instead of the smooth appearance of health and the sharply-defined anterior and posterior pillars, the membrane appears as if formed of unevenly distributed folds, and presents a granular appearance. The posterior pillars are sometimes thickened sufficiently to cause complete obliteration of the recess between them and the pharynx proper. The uvula is generally implicated and elongated, this being due not so much to the disease itself as to the constant hacking and scraping indulged in to clear the throat. The tonsils are involved in the majority of cases.

Prognosis.—Although in no way dangerous to life, chronic pharyngitis is persistent, and is likely to become aggravated unless the initial causes be avoided, and an uninterrupted and prolonged treatment be submitted to.

Treatment.—In this affection, general treatment is of the utmost importance. In the majority of cases hepatic torpidity, evidenced by the coated tongue, maintains a local congestion of the pharynx, and attention to the liver will give relief when all local measures will fail. Podophylin, calomel or Hunyadi water, in small, but often repeated doses, have been productive of best results in my hands. Gastric disturbances, when present, should be carefully attended to, while abstinence from habits which tend to maintain the trouble should be enjoined.

Of the local remedies, the application of which should always be preceded by careful cleansing, nitrate of silver, forty grains to the ounce, is in my opinion the most effective, this conclusion having been reached after trying a large number of other agents. As stated in the chapter upon therapeutics of the nasal cavities, nitrate of silver causes contraction of the blood-vessels, thus diminishing the local congestion, while it stimulates the absorbents also, inducing therefore, absorption of the inflammatory products. Weak solutions, on the contrary, of ten, fifteen, or even twenty grains to the ounce, only stimulate the superficial blood-vessels and increase the inflammatory process. Applied once daily with the brush (taking care to not take up too much of the solution, lest it run into the larynx) it will in a very short time produce great relief, and if continued sufficiently long in conjunction with the internal treatment, will cure the affection. Sulphate of copper, ten grains to the ounce, applied in the same manner, is effective in some cases, but the applications must be continued during a long period. Occasionally, cases are met with in which astringents, in whatever form or strength they may be administered, increase the inflammation. Soothing applications are therefore indicated. Vaseline, rendered liquid by exposure to heat, and applied with the brush three or four times daily, is generally very effective, or the O cosmoline, the specific gravity of which is sufficiently low to enable it to be used in the atomizer, may be employed.

FOLLICULOUS PHARYNGITIS.

(Synonyms:—Follicular Pharyngitis; Granular Pharyngitis; Clergymans' Sore Throat; Speakers' Sore Throat.)

Etiology.—The great prevalence of this affection among persons who, in their avocations, are obliged to use their voice extensively, such as clergymen, lawyers, singers, hucksters, etc., makes it evident that one of its causes, and probably the most important, is extensive use of the vocal apparatus, under certain unfavorable conditions. Whether this be due to an inherent liability of the membrane to become influenced in that manner by over use of the vocal powers, or to some defect in the method of delivery, is difficult to ascertain, but it is probable that both play an important part in its causation. The continued oral breathing in more or less dusty atmospheres doubtless adds greatly to these primary causes. Scrofulous and rheumatic individuals seem to be more predisposed to it than others, while anemia is a frequent accompaniment in marked cases.

The affection is usually seen in young and middle aged people, although old age cannot be said to be exempt. It is a frequent complication of chronic affections of the nose and naso-pharynx, the contact of the irritating secretions being most probably the exciting cause, while the hacking and coughing accompanying these affections tend to aggravate it. The inhalation of irritating substances, smoke and dust, are also frequent causes.

Pathology.—The principal pathological conditions characterizing this affection in addition to the vascular engorgement and tissue changes of chronic pharyngitis, consists in a blocking up, as it were, of the mouths of the follicles. Their products accumulating more and more, each follicle finally becomes metamorphosed into a foreign body, which, becoming encysted, as it were, remains in that state indefinitely, irritating the surrounding parts. How this condition is brought about by extensive use of the voice seems to me explainable: the follicles are overtaxed by the unusually great amount of lubrication required, and this being frequently repeated, an inflammatory process is gradually induced.

External irritants and purulent discharges from the nasopharynx cause inflammation of the mouths of the follicles, which gradually causes their closure.

Symptoms.—The onset of the affection is usually characterized by an occasional sensation of dryness in the pharynx and larynx, which continues for a short time. At the end of a few days, perhaps after a prolonged conversation, the same symptom recurs, to follow the same course as the preceding attack. This is repeated several times at varying intervals, each attack becoming longer, until a constant malaise of the entire throat is experienced, which in time gradually increases in intensity. This process may take a few weeks, perhaps a few months, and frequently two or three years. The voice becomes slightly hoarse upon the least exposure or exercise in speaking, preaching, or singing, and if the exercise is continued any time, a sensation of great fatigue in the parts is experienced. A short hacking cough is usually present, accompanied by a disposition to clear the throat frequently and to expectorate. When the disease has progressed for some time, pain, or a sensation akin to it, and resembling that produced by the presence of a foreign body, a pin, a fish bone, etc., is complained of, which frequently leads the patient to believe that he has actually swallowed some sharp object. In some cases, a sensation of rawness or scratching is experienced, which becomes painful when deglutition is performed. Hawking, expectorating and coughing become almost permanent in bad cases, the discharge generally consisting of tough, glairy mucus, contaminated with muco-purulent masses or scales, if a nasal affection is also present. The cough is provoked by a tickling sensation in the larynx. The voice loses its timbre, becoming veiled in addition to the hoarseness; these symptoms, however, disappear temporarily when "hemming" is practiced. Elongation of the uvula is often induced by the hawking and the continued congestion.

Inspection of the parts reveals the striking characteristic of the affection, a number, more or less great, of rounded projections, reddish in color, with white apices, standing out like pimples, from the surface of the membrane. A few only may appear, distributed unevenly over the entire mucous surface, including the pillars; they may be separated or coalesced into clusters of three or four. Enlarged vessels are generally seen coursing between them, appearing in some cases to terminate in them, or, if veins, to start from them. In some cases, these enlarged follicles burst and discharge a thick, cheese-like substance, which escapes from a minute opening at the apex of the growth. At times it adheres tenaciously to the mouths of the follicles, forming small, ill-smelling patches of irregular shape, which can be peeled off without difficulty. This exudative form (termed so in contradistinction to the other variety, which is called the hypertrophic form) of the affection, is most frequently located upon the anterior and posterior pillars and the tonsils, where the secretion occasionally assumes a calcareous character. The base of the tongue is sometimes implicated, its glands and follicles becoming inflamed and hypertrophied.

Prognosis.—Follicular pharyngitis can generally be cured by an appropriate treatment, conducted systematically over a prolonged period. Left to itself, it does not present any danger to life, but it may encourage the development of other affections of the larynx and naso-pharynx through the permanent congestion maintained.

Treatment.—The treatment of this form of pharyngitis is essentially surgical, while any dyscrasia, such as scrofula, syphilis, rheumatism, herpetism, etc., should be treated with appropriate remedies. The state of the digestive apparatus should be carefully inquired into and appropriate remedies administered. The liver will frequently be found torpid, constipation being often complained of, and the tongue showing by a yellowish fur the evidence of hepatic engorgement. Mild purgatives are always advantageous in these cases, followed up by the administration of phosphate of sodium, one drachm night and morning. Cascara sagrada is an excellent aperient in these cases, from fifteen to twenty drops of the fluid extract being taken when required.

The object of the surgical procedure is, both in the hypertrophic and exudative forms, to destroy each enlarged and engorged follicle, and thereby the circuitous inflammation which its presence maintains. This may be done by means of a number of methods, which I will describe in the order of preference.

Galvano-cautery has by far given the best results. Besides being a painless means, it gives rise to no disagreeable after-symptoms and does its work effectually. A small loop twisted at the tip so as to form a miniature corkscrew, is the most effective instrument, penetrating deeply into the follicle and emptying it of its contents when withdrawn, while not creating enough local disturbance to give rise to annoying symptoms. After cleansing the pharyngeal wall thoroughly, each engorged follicle should be touched separately, six or seven being cauterized at each sitting. Hardly any discomfort is caused during the operation, a slight sore throat, lasting a couple of days, representing about all the after-effects. A few days later the cauterizations are renewed, and repeated as often as required. In the exudative form, a pair of long, fine forceps should previously be employed to dislodge the layer of cheesy matter. After each sitting, the burnt spots present a white appearance, with a small inflammatory areola. When the white scab disappears a red spot is left, which in turn is replaced by a small cicatrix. The relief is almost immediate and is lasting. When the superficial vessels are large and present evidences of varicosity, the larger ones had better be cauterized in the same manner.

Actual cautery is also very efficient. A good-sized sharp piece of wire, mounted upon a wooden handle, is heated to a red heat in the fire of an alcohol lamp and applied to each follicle, the manipulation being conducted and repeated as with galvano-cautery. The fire of an oil lamp or gas should not be employed, the carbonaceous deposit which is often formed at the end of the wire retarding greatly the resolution of the burnt follicle if accidentally introduced into it.

A small incision into each follicle, and then touching the spot with solid nitrate of silver melted on the end of a probe, is another method much in vogue at one time, but which has become almost obsolete on account of the pain occasioned and the somewhat severe after-effects. Nitrate of silver, applied without incision, is effective when the follicles are seen in their early stage of formation, *i.e.*, when merely a small red elevation is visible. An instrument such as that used for actual cautery may be employed. Its tip, being heated over an alcohol lamp, is applied against the nitrate of silver crystal, enough of which will adhere for two or three applications. It is best, however, to renew the coating of silver for each application. The resolution of the parts in this method of treatment, does not take place as rapidly as in the others described, and more time should elapse between the sittings. Morell Mackenzie recommends London paste, preferring this agent to all others. The preparation being rubbed up with sufficient water to make a thick cream, is applied to two or three follicles at each sitting, and in some cases to one only. The patient should then gargle with cold water, to remove any excess of the caustic. I have found this method more troublesome and painful than the others, without increased benefit.

The follicles once destroyed, the chronic inflammation existing in the membrane proper should receive attention. The local treatment recommended in chronic pharyngitis will be found as advantageous in the folliculous variety.

MEMBRANOUS PHARYNGITIS.

(Synonyms:—Membranous Sore Throat; Aphthous Sore Throat; Croupous Pharyngitis; Herpes Pharyngis.)

Etiology.—Membranous pharyngitis usually occurs in persons of weak constitution. Exposure to the influences of infectious matter, or close contact with persons suffering from septic affections, such as diphtheria, scarlatina, etc., are among the frequent causes of the complaint, while cold may also excite it primarily, especially in persons who have already suffered from it.

Pathology.—The affection consists of an acute superficial inflammation of the mucous membrane, characterized by the exudation of a whitish substance which coagulates over its surface in the form of thin patches, which are frequently mistaken for those seen in diphtheria. In the latter affection, the exudation involves the entire thickness of the membrane, while in membranous pharyngitis it is limited, as stated, to the surface.

Symptoms.—Membranous pharyngitis is usually ushered in by a chill or creeping sensations in the back, a slight headache and soreness in the throat. Deglutition soon becomes painful, and a thick ropy mucus is expectorated with some difficulty. The tongue is usually furred, the skin is hot, and the pulse is sometimes quite high.

Seen in the first stage of the affection, the mucous membrane of the pharynx and all the adjoining parts appears quite red, the redness being still greater over certain limited areas or spots, especially around the tonsils. After a short time these areas become covered with a whitish exudation, which spreads over the membrane and forms patches. These can be easily detached with a suitable instrument, differing entirely in this peculiarity from diphtheria, in which the false membrane can only be torn away with great effort, causing sometimes copious hemorrhage. The appearance of the false membranes of the two affections differ also in a marked manner. In diphtheria it is of a dirty yellow, with somewhat everted edges and surrounded by a dark-red areola; in membranous sore throat, the exudation is perfectly white, with sometimes a tint of pink or gray. Its surface is even, and the areola, if any exist, is hardly discernible.

Prognosis.—The prognosis of this affection is favorable in almost every case, its duration being, at the longest, of two weeks. Extension of the false membrane to the larynx, however, may cause death by obstructing mechanically the passage of air; but such an accident is extremely rare.

Treatment.—A mild aperient is usually indicated in these cases, the salines being preferable. Pain should be combated by anodynes, while the asthenic nature of the affection should be antagonized by quinia and general tonics. Wine of coca is exceedingly valuable in this affection, a wineglassful every two hours tending greatly to diminish the local pain, while bracing the system. Locally, limewater used with the atomizer and as a gargle, can be employed with advantage to keep the throat clear of pseudo-membrane, which necessitates its use every hour. Chlorate of potash lozenges. gr. v to each lozenge, can also be employed. A plan which I have used with great success, especially in children, is first to detach the false membrane by spraying or with a pledget of cotton, then to paint the underlying mucous membrane with a ten-grain solution of permanganate of potash every three hours, giving wine of coca internally. The affection is generally cut short in a couple of days.

ATROPHIC PHARYNGITIS.

(Synonyms :—Pharyngitis Sicca, or Dry Pharyngitis.)

Etiology.—Atrophic pharyngitis generally occurs as a sequel of chronic or folliculous pharyngitis, or as a result of continued exposure to dust, smoke, the emanations of certain irritating substances, and to the prolonged contact of irritating discharges from the posterior nasal cavity. Sleeping with open mouth is also an occasional cause. Shurly, of Detroit, ascribes the disease to organic derangement of the stomach or allied organs in most cases. In old people it frequently occurs as an expression of the general senile debility.

Pathology.—The principal feature of this affection is the state of inactivity of the glands and follicles, brought on by the pressure exerted by inflammatory products upon them, and through which the mucus necessary to keep the parts lubricated is not generated. Dryness necessarily ensues and the desiccated condition of the pharyngeal surface causes contraction, which in turn induces pressure upon the underlying tissues. These, with the greater part of the vascular supply and glandular elements, are absorbed, reducing the membrane to half its normal thickness.

Symptoms.—The prominent symptom of this affection is an intense dryness of the pharynx, extending sometimes to the naso-pharynx. A sensation of stiffness is experienced, with a frequent tendency to deglutition, prompted by an unconscious desire to lubricate the parts. Eating and drinking is generally followed by momentary relief, while deglutition is sometimes performed with difficulty through the impaired action of the constrictor muscles, which become rigid and stiff in the affected portions. Swallowing "the wrong way" is a frequent accident through the impaired action of the epiglottis, which occasionally takes part in the inflammatory process and the impaired sensitiveness of the pharynx. A dry cough is occasionally present through implication of the larynx.

Upon examination, the membrane of the pharynx appears perfectly dry and lustrous, with perhaps small, muco-purulent masses adhering to its surface with tenacity. These may originate in the posterior nares, or from erosions on the surface of the membrane, caused by the irritating action of foreign particles, which remain on the surface through lack of secretion to wash them away. The outline of the bodies of the underlying vertebræ can generally be discerned when the disease occurs in an old subject. The dryness can frequently be seen extending to the posterior nares and the larynx. The membrane is somewhat paler than normal.

Prognosis.—In young people the affection can generally be cured, but in middle aged and old subjects, temporary relief only can be furnished.

Treatment.—The first indication in the treatment of this affection is to keep the membrane free of discharges by cleansing it as frequently as possible, while the liquid employed should contain an agent having a tendency to maintain the parts in a moist condition. A saturated solution of chlorate of potassium is, in my opinion, the best solution for the purpose. It may be used as a gargle if the patient can gargle properly, or it may be used with an atomizer, in both cases as frequently as possible. Any hurtful habit should be corrected, the mouth being tied up at night if necessary. A slightly stimulating application every day is the next requisite, to increase the nutrition of the membrane by inducing the formation of new blood-vessels. Too stimulating a remedy should be avoided, the inflammation resulting being more harmful than beneficial. The ten-grain solution of nitrate of silver has served me more satisfactorily than any other agent for the purpose, applied with a cotton pledget. Iodine, in an equal quantity of glycerine, as recommended by Fauvel, of Paris, is also an efficient remedy, but less so than the other. In young people this treatment, when carried out faithfully, generally gives rise to favorable results in from one to four months. In persons of mature age, internal treatment should be added, to stimulate the secretory function of the mucous membrane or that of the salivary glands. Jaborandi, in the form of the hydrochlorate of pilocarpine, gr. $\frac{1}{8}$, three times a day, is perhaps the most effective remedy. Iodide of potassium, gr. iij, and chlorate of potassium, gr. v. are sometimes preferable, especially where there exists some catarrhal affection of the nasal cavities. Fifteen drops of the oleo-resin of cubebs on sugar, is another agent possessing much merit. Shurly lays much stress upon general treatment to suit the systemic disturbance acting as cause. Galvanism is recommended by him, the positive pole being applied to the pharynx. Daily sittings are necessary for about two weeks, after which they can gradually be diminished. Muriate of ammonia, administered in tablets containing gr. iij each, is advantageous to keep the pharyngeal wall moist. In aged people, continued local treatment is necessary to insure comfort, a cure being doubtful, if at all possible.

CHAPTER XVIII.

DISEASES OF THE PHARYNX—(*Continued*).

TUBERCULOUS PHARYNGITIS.

(Synonyms:—Tuberculosis of the Pharynx; Consumption of the Pharynx.)

Etiology.—Tuberculous pharyngitis generally presents itself as a complication, either of tuberculosis of the lungs or the larynx, or of both, rarely preceding them. Its etiology is the same as that of tuberculosis occurring in other parts, a subject which will be treated under the head of tuberculous laryngitis. The same will be the case as regards the pathology of the affection.

Symptoms.—The early symptoms of a case of tuberculous pharyngitis are generally those which present themselves in the early history of acute pharyngitis. Deglutition becomes very painful, especially if any irritating substances, such as strong liquors, vinegar or condiments are swallowed. As the disease advances these symptoms increase in intensity; the pulse becomes rapid, the temperature high, and the tongue covered with a whitish fur. Soon after the beginning of these symptoms, the ulcerative process makes its appearance. A shallow, grayish ulcer, with indistinct outline, presents itself on the pharyngeal wall, pillars, or soft palate (most frequently the latter in the cases seen by me), gradually increasing in depth and giving rise to a slimy yellowish discharge. The pain becomes continuous, with exacerbations when swallowing; it is of a sharp, lancinating character, and frequently extends to the ear. The throat is parched and dry. The ulcerative process extends with more or less rapidity, but in most cases, five or six weeks are sufficient to create enough local disturbance to render alimentation by the mouth impracticable. When the soft palate is greatly ulcerated, liquids are often forced into the nose.

Prognosis.—The prognosis of tuberculous pharyngitis is as unfavorable here as in the tuberculous manifestations in other parts, with the difference that on the whole its course is more rapid. Six months represent the maximum of life in the cases reported, while in the majority, death occurred in from six to ten weeks after the first local manifestation.

Treatment.—Judging from its effects in tuberculous laryngitis, we doubtless have in cocaine an agent of the greatest value in the treatment of tuberculosis of the pharynx. The excruciating pain which accompanies it, can, with a ten per cent. solution, be kept at bay, and the patient receive the benefit of an amount of alimentation which the suffering occasioned by deglutition would otherwise cause him to refrain from taking. It should be applied sufficiently often to prevent all pain, after cleansing the ulcerated surface with a borax spray (gr. v–℥j). Cauterizations with nitrate of silver, in the solid form or solution, have, in my hands, proven more hurtful than beneficial. I have obtained more satisfactory results, as far as contributing to the patient's comfort is concerned, by sedative applications. Steam inhalations, with succus conium, a dessertspoonful in a half pint of water at 130° Fahr., or inhaling the steam of hot infusion of belladonna, hyoscyamus, or opium, have proven very valuable in diminishing pain and facilitating deglutition. Morphia, given internally, or applied locally, gave rise to so much dryness of the parts that I had to abandon its use.

When deglutition becomes impossible, Bryson Delavan's feeding bottle, described later on, may be used to great advantage, or the patient can be fed by the rectum.

SYPHILITIC PHARYNGITIS.

(Synonyms:—Syphilis of the Pharynx; Specific Chronic Pharyngitis; Syphilitic Sore Throat.)

Etiology.—As in the nasal cavities, syphilitic manifestations may occur as a result of direct contamination or as a symptom of the secondary or tertiary periods of syphilitic infection. Primary syphilis in this location is more frequently met with than in the nose, contact with an infected subject, in kissing or biting, using table utensils or glass, spoon or fork, etc., improperly cleansed after having been used by a syphilitic individual, and certain loathsome practices, rendering the pharyngeal cavity more exposed to direct infection. Secondary syphilis of the pharynx is met with in the majority of cases of constitutional syphilis, the predilection of this region to become affected by the systemic dyscrasia, being probably greater than any other portion of the system, after the vulva and anus. Tertiary lesions are of frequent occurrence, and may present themselves, as in the nasal cavity, as long as thirty years after the primary infection, although six or seven years represent about the interval between the primary and tertiary manifestations. Syphilitic pharyngitis may also be hereditary.

Pathology.—The remarks on the general pathological manifestations of syphilis occurring in the mucous membrane made under the heading of syphilitic rhinitis, are also applicable to syphilitic manifestations of the pharynx.

Symptoms.—The symptoms of syphilitic pharyngitis vary according to the stage of the disease. In primary syphilis, the subjective symptoms are usually so slight as to be overlooked at first. After a few days the glands under the angle of the lower jaw become painful to the touch, and examination of the throat reveals one or more reddish or whitish abrasions, with slightly elevated edges. These almost always heal spontaneously, but they may, as was the case in Diday's patient, be followed by phagedænic ulceration. Their differentiation from tuberculous ulceration is somewhat difficult.

Secondary lesions may present themselves in two forms, as an erythema, and in the form of mucous patches. They are apt to be located symmetrically, on both sides of the pharyngeal cavity. Erythema usually begins by a diffuse redness of either the entire cavity or only a portion thereof. The symptoms of an ordinary sore throat are then experienced, with dryness and pain, and sometimes slight pyrexia. After a few days, sometimes only twenty-four hours, clearly outlined patches show themselves, located on the tonsils and anterior pillars, the pharyngeal wall, or the soft palate, and coalescing at times so as to form an almost continuous chain of blotches, which present in color the ordinary aspect of catarrhal inflammation. The larynx generally becomes involved, cough and hoarseness being added to the other symptoms. Mucous patches generally make their appearance upon the anterior pillars and the soft palate; they may be found, however, in any other portion of the pharyngeal and oral cavities, the sides of the tongue being a favorite site for them. At first they appear as mere circumscribed, regularly defined, oval elevations, which soon become dark red, then slightly excavated, afterwards changing in color to a whitish gray. The subjective symptoms are more accentuated than when erythematous patches are present, the dysphagia especially being greater.

Tertiary manifestations do not present the same degree of symmetry as those of the second period. The soft palate and one of the tonsils are generally the first invaded, the ulcerative process spreading rapidly. In almost every case, the first local trouble is the formation in the layers of the membrane, of one or more gummous tumors, which form small nodular swellings; these may remain inactive for some time, or proceed at once to soften, suppurate, and give rise to a deep-seated ulceration. The ulcer formed is cup-shaped, with an irregular, sharply cut and jagged edge, and covered by an ichorous yellowish discharge. When situated in the soft palate, it is quite likely to cause perforation. Located on the posterior wall of the pharynx, adhesion of the soft palate is liable to take place, the parts healing together. The ulcerative process may create great havoc in all the parts, the cicatricial contraction which generally follows often limiting the isthmus markedly, and sometimes closing it up altogether, as was the case in a subject under my observation. The subjective symptoms are not commensurate with the degree of local mischief, although sometimes great pain is experienced; deglutition is always difficult and in some cases liquids can alone be swallowed; slight cough is usually present, due to involvement of the larynx in the general congestion. The tumefaction of the soft palate prevents its apposition against the wall of the pharynx, and the voice acquires the nasal twang.

Prognosis.—The prognosis of syphilitic pharyngitis as regards life, can only be unfavorable when the disease occurs as a manifestation of tertiary syphilis. The liability of the ulcerative process to penetrate deeply into the tissues, menacing bones, cartilage, and blood-vessels, creates dangers which, although seldom realized, are nevertheless to be feared, and thwarted if possible. In debilitated persons, and in those in whom the disease has existed in its active form for a long time, death may take place by exhaustion.

Treatment.—The constitutional treatment recommended in syphilitic rhinitis is as valuable in syphilis of the pharynx, and often suffices to induce prompt recovery. Local cleansing is of the greatest importance, and should be practiced several times in either of the three stages of the disease. I have used with much success in these cases, the permanganate of potash solution described on page 118. It is not only an effective detergent, but the slight stimulation which it produces tends to hasten resolution. Besides these qualities, it is an excellent disinfectant and soon changes the character of the secretions. In the primary stage, but little if any other local medication is necessary; a weak astringent such as a five grain solution of sulphate of zinc or acetate of lead may be used to perhaps hasten the recovery, which almost always occurs spontaneously in a week or so. In secondary symptoms, a solution of nitrate of silver (gr. xxx–℥j) has given me the greatest satisfaction, applied with a camel's hair pencil to each blotch after thorough cleansing. Iodoform is also very useful, but its unpleasant odor renders it very objectionable to the patient. Tincture of the chloride of iron, fifteen minims in a drachm of glycerine, is also very efficient, painted over the mucous patches three times daily. In the tertiary form, the mitigated stick (composed of one part of oxide of silver and nine of nitrate of silver) is, in my opinion, more effective than any other application. It should be applied carefully to the ulcerations and some distance around the margin, after careful spraying. Acid nitrate of mercury is another valuable remedy, used in the same manner. Iodoform can also be used with good effect. Powdered astringents such as alum, tannin, etc., can be used with benefit by insufflators, their constringing action upon the blood-vessels decreasing the intensity of the inflammation.

CHAPTER XIX.

DISEASES OF THE PHARYNX—(*Continued*).

RETRO-PHARYNGEAL ABSCESS.

Etiology.—The formation of an abscess in the posterior wall of the pharynx may occur as a complication of acute pharyngitis, or be due to inflammation of the connective tissue and lymphatic glands between the pharyngeal walls and the vertebræ, or of the latter themselves. It is most frequent in the early months of life, although it may occur at any age. Scrofula and syphilis are predisposing causes of the idiopathic abscess, which is the most common form. It occasionally follows scarlatina, erysipelas, diphtheria, and other exanthemata. It is often caused by traumatism, falls against some sharp instrument which penetrates the opened mouth, swallowing spicules of bone, etc. Necrosis of the vertebræ is a frequent cause of retro-pharyngeal abscess.

Symptoms.—The early symptoms of the formation of a retro-pharyngeal abscess are but seldom characterized by systemic disturbance. A slight chill or occasional chilly sensations may be experienced, with some headache. The local symptoms are usually those which first attract attention, and these vary according to the location of the abscess. It may be located sufficiently high and be hidden behind the soft palate, and require the rhinoscope to ascertain its outline; it may be situated opposite the larynx, and only be seen in its entirety with the laryngoscope; again, it may be located on the side, behind the posterior pillar. In the majority of cases, however, its situation is in the posterior wall of the pharynx, facing the oral cavity, and on either side of the median line. When the abscess is situated high up, a sensation as if a foreign body were located in the vault is experienced, accompanied by difficult deglutition and some interference with the respiration through the nose. Pain of a dull, throbbing character, but occasionally very sharp and lancinating, may be felt, accompanied by headache and tinnitus. The speech becomes nasal and devoid of resonance, the consonants being accompanied by a sound of "escaped air" through the nose. When opposite the larynx, dyspnœa is a marked symptom, coming on in spasmodic attacks which endanger the patient's life; swallowing becomes very difficult and dangerous, owing to the occasional passage of food into the larynx, and this is likely to occur frequently unless great care be taken. This danger is further increased by the interference presented by the bulging surface to the free motion of the epiglottis. When the abscess is in the posterior wall of the pharynx, respiration is not interfered with until it has attained great size. In addition to the local symptoms, there is swelling of the neck on the side of the tumor, and the cervical glands may be enlarged and painful. The head is drawn to one side or forward in some cases, and can only be raised with great difficulty. As the formation of pus proceeds, fever and pyrexia are generally present, the pulse being weak and easily compressed. Left to itself, the abscess generally bursts spontaneously, a mass of pus being suddenly evacuated into the mouth or throat, sufficiently great sometimes, to asphyxiate the patient. At times the pus burrows under the tissues and forms an opening at some remote point. If near the larynx, œdema may be caused by penetration of the suppuration into the ary-epiglottic fold.

The tongue being depressed, a tumid swelling, red and dusky in color, is seen to project into the pharyngeal cavity, the view being more or less complete according to its location. The surrounding parts, the pillars and uvula, are usually inflamed and swollen, especially on the side of the abscess. With the finger, fluctuation can generally be felt almost from the start, although weeks are sometimes passed before the accumulation of pus is sufficiently great to cause rupture.

The symptoms of retro-pharyngeal abscess resemble, in some particulars those of croup. Cough, however, is absent, a marked feature of the latter disease, while the voice is rarely affected. Again, it is often confounded with and treated for acute tonsillitis. Œdema of the larynx has also been mistaken for it in the adult. The propriety of always examining the throat carefully in croup and other diseases in which the larynx and pharynx are implicated, is here well exemplified, the life of the patient depending greatly upon a proper recognition of the trouble.

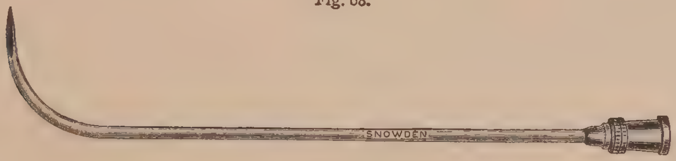
Prognosis.—When the abscess is caused by caries of the vertebræ, the prognosis is unfavorable, death taking place in the majority of cases. In the other forms of abscess, it is rarely fatal except by accidental causes, such as asphyxia by the sudden escape of pus into the larynx, etc.

Treatment.—The only treatment is the evacuation of the contents of the abscess by an incision with a bistoury or by withdrawing the fluid by means of a trocar and aspirator. When the former means is employed a small vertical incision high up (as recommended by Dr. MacCoy, of Philadelphia), and not at the point of greatest tension, avoids the danger of suffocation by the sudden flow of a large quantity of pus which a free incision would occasion. After the tension of the abscess has been relieved, the incision can be somewhat extended, but only to a limited extent, lest particles of food penetrate into it during the act of deglutition.

The abscess can be emptied gradually by digital compression, the pus being worked out by gently sliding the finger upwards over it, so as to bring the fluid to the level of the incision. The discharge continues for some time, the cavity growing smaller and smaller until the wound is healed.

In using the aspirator, a straight trocar pushed in at right angles with the growth is liable to wound the posterior wall of the abscess, or to pierce the vertebræ, an accident which may take place in the most careful hands, owing to the resistance which is sometimes offered to the penetration of the trocar point, and the suddenness with which it enters the cavity of the abscess. A trocar shaped like that shown in the cut, can be introduced from below, and the operation can be performed without the least danger, while a ten per cent. solution of cocaine applied freely over the abscess and the surrounding parts will prevent all pain.

Fig. 68.



Retro-pharyngeal abscess trocar.

TUMORS OF THE PHARYNX.

Although tumors in the pharyngeal cavity are rarely met with, almost every variety of growth may be found there. Cases of sarcoma, fibro-sarcoma, fibroma, osteoma, enchondroma, adenoma, papilloma, cysts and lupus, have been reported. These growths may originate in the pharynx proper, or penetrate into it from the surrounding parts. Their most frequent location is on the lateral walls, involving the palatine folds, and extending to the surrounding parts. They present the same properties, in shape, density and color, as in the nose. Aneurism of the internal carotid artery has also been seen in this location, a globular mass protruding into the pharyngeal cavity.

Symptoms.—The presence of pharyngeal tumors is usually not recognized until they have attained sufficient size to interfere with deglutition or with respiration. As in retro-pharyngeal abscess, the symptoms vary according to the location of the growth. Outside of carcinoma and lupus, which are ulcerative and very painful, and gradually spread to the surrounding parts, all the other varieties named are characterized by obstruction to both deglutition and respiration, pain being usually very slight. Pharyngeal tumors may be mistaken for retro-pharyngeal abscess or hypertrophied tonsils. Palpation, however, in connection with a careful examination, will serve to establish the true diagnosis.

Treatment.—The treatment consists in extirpation, when practicable. This may be done by means of the knife, the snare or galvano-cautery. Electrolysis may also be employed, especially when the tumor is not of hard consistence.

PARALYSIS OF THE PHARYNX.

Etiology.—Paralysis of the pharynx, which implies paralysis of its muscles, may occur as a result of general disease with local expression, such as diphtheria, or syphilis, or be due to a cerebral affection implicating the nerves which supply the pharynx. The paralysis may be limited to one constrictor muscle, or involve them all; it may involve one side of the pharynx or both, and if the latter be the case, it is generally more marked on one side than on the other. It is an occasional complication of hemiplegia, being limited to the same side. It frequently occurs as a precursor of death in febrile diseases.

Symptoms.—The most marked symptom is the difficulty of deglutition, the greatest efforts being required to force the food down the œsophagus. Liquids are generally swallowed with less difficulty, but their frequent passage into the larynx, especially when the epiglottis is also paralyzed, renders their use dangerous. When the soft palate is involved, the food may be forced into the posterior nasal cavity, through the efforts of the tongue to assist deglutition.

Treatment.—The central causes should be carefully sought for and treated. Strychnine hypodermically and general tonics are almost always indicated. Arsenic is especially valuable when the affection is a sequel to diphtheria. Electricity serves the double purpose of assisting in the diagnosis and restoring motion. When the paralysis is of central origin, an interrupted current will cause contraction of the muscles, but this contraction will not occur if atrophy of the muscles is the principal pathological element of the case; the cure will then be rendered much more difficult, if at all possible. Therapeutically, electricity should be applied with both electrodes over the muscles for about ten minutes every other day.

FOREIGN BODIES IN THE PHARYNX.

The two classes of objects which are most frequently found in the pharynx, are, firstly, those presenting sharp points or asperities, such as needles, pins, tacks, fish-bones, fragments of meat, bone, bristles, etc., which the contractions of the constrictors in deglutition force into the pharyngeal walls, and, secondly, those whose dimensions do not allow their passage into the œsophagus, such as pieces of meat, bread crust, false teeth, coins, etc.

Symptoms.—Objects which are long and narrow, such as pins, needles, fish-bones and bristles, are generally caught transversely, and are found sticking into the sides of the pharynx in almost every case, at times as high up as the tonsils; tacks, being of small size, are rarely caught by the constrictors, this being only possible providing its long axis be antero-posterior, while passing behind the larynx. As a general thing they do not reach as far as that region, but fall on either side of the epiglottis into the pyriform sinus, where they are generally found. Bodies which are arrested on account of their size, are usually found either behind the larynx or above it, and resting upon the epiglottis, which they sometimes hold down. Small objects, such as buttons, pebbles, etc., generally slip into the glosso-epiglottic fossæ or into the pyriform sinuses.

The symptoms vary greatly according to the nature of the foreign body. When a small, sharp object is impacted in the pharynx, the sticking sensation which it gives rise to is markedly increased by deglutition; or, it may be felt in two places at once, the latter being often the case when a needle, for instance, is swallowed. Large bodies, by holding the epiglottis on the larynx, may cause death before assistance can be obtained. Lodged in one of the pyriform sinuses they do not give rise to as much discomfort as in other locations, and may remain there for a long time without interfering with the functions of the surrounding parts.

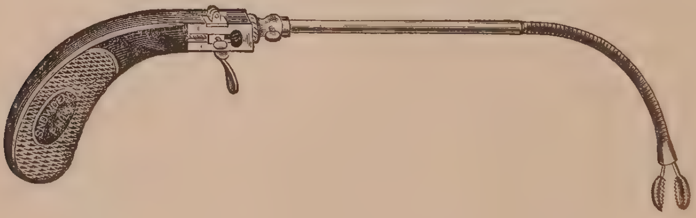
Localized spots of irritation, such as inflamed follicles, when situated low down on the pharyngeal wall, frequently give rise to the sensation produced by a foreign body. This sensation may also be caused by a piece of bone or a crust of bread, which, when swallowed, scratches the membrane, leaving an abraded spot. Again, a foreign body may have become impacted, then swallowed or ejected, and the patient still continue to experience the sensation that it gave rise to before being ejected. These facts, to which may be added the imaginary foreign body of hysterical women, are of importance, and should be remembered when measures to extract it are to be resorted to.

Prognosis.—Sharp objects, by being forced into one of the large arteries of the neck, may cause death by hemorrhage, while, as we have seen, asphyxia may be caused by a large foreign body. In the great majority of cases, however, the object can be withdrawn without trouble, the patient recovering very soon.

Treatment.—The laryngeal mirror is of great assistance in ascertaining the position of the impacted body. The nature, shape and density of the object swallowed being ascertained, it may be looked for in the portion of the pharynx, in which, as explained above, it is most likely to become located. A satisfactory examination of the parts is not always obtainable, however, owing to the marked congestion generally present and the quantity of saliva secreted. The index finger can then be used to advantage, by passing it into the pharynx and examining each part as it is reached; the right finger should be used for the right side of the throat, and the left for the left side, so as to always have its palmar surface against the membrane. The finger may not only be used for the exploration, but also to grasp the foreign body and withdraw it. The recess between the nail and finger is well adapted for the entrance of the shaft of a pin, for instance, and once in position can be held firmly by resting the palmar side of the finger against the nearest surface while drawing it out, the pin being thus held tightly in its position. When the object is too large to be grasped in this manner, the finger should be held on the foreign body until a pair of forceps, introduced by slipping them along the finger can be fastened on to it. The most convenient instrument for the purpose is Seiler's tube forceps shown in Fig. 69. The flexible tube shaft can be conveniently adjusted to any suitable shape, thus facilitating its introduction in any part of the pharyngeal cavity.

When, through the presence of a large foreign body, the patient's death appears imminent, tracheotomy must be performed at once, or if the necessary instruments are not at hand, the trachea can be opened with a penknife, and maintained so until the foreign body can be withdrawn. This extreme measure, however, is rarely necessary, and there is usually sufficient time to pass the finger in the throat and extract the offending object.

Fig. 69.



Seiler's tube forceps.

After a foreign body has been extracted, there remains for a time a sensation as if it were yet there, and it is sometimes difficult to persuade the patient that there is not another foreign body in his throat. This might possibly be the case, however, and a careful examination should always be made.

CHAPTER XX.

DISEASES OF THE TONSILS AND UVULA.

TONSILLITIS.

(Synonyms:—Quinsy; Amygdalitis; Cynanche Tonsillaris; Angina Tonsillaris; Angina Faucium.)

Etiology.—Inflammation of the tonsils is a common affection in young people, especially between the ages of twelve and thirty. As age advances, it becomes of less frequent occurrence, presenting itself very rarely after the fiftieth year. Exposure to cold and damp is the most prolific cause of tonsillitis, especially when the subject has already had it. Hypertrophy of the tonsils predisposes to it, as do also the rheumatic and scrofulous diatheses. It is an occasional complication of scarlatina, variola and measles. It may be caused traumatically by the action of caustic acids, an impacted foreign body, external injury, etc.

Pathology.—The inflammation may be deep-seated and involve the parenchyma of the organ (parenchymatous tonsillitis) or be merely superficial (erythematous tonsillitis). In the former case the affection is likely to manifest itself principally in one tonsil, while in the latter, the inflammatory process generally involves both equally. When the inflammation is deep-seated, an abscess generally occurs, which increases in size until opened. Repeated frequently, parenchymatous inflammation of the tonsils soon induces hypertrophy. The brunt of the inflammatory process is sometimes located in the crypts of the tonsils (folliculous tonsillitis), a soft, cheesy exudation being poured out from the follicles and forming a number, ten to fifteen, of small patches, representing the number of crypts affected.

Symptoms.—A chill, more or less marked, is generally the first symptom experienced. Pains in the legs and back, headache and fever, characterize an attack of more than ordinary intensity. A sense of dryness and stiffness in the throat, with diminution of secretion, is soon noticed, and dysphagia soon sets in. The sufferings of the patient now become quite severe; the dryness of his throat tends to induce frequent deglutition in order to cause lubrication of the parts and this is accompanied by so much pain that the features are distorted at each effort. Inflammatory infiltration of the muscles of the jaws renders opening of the mouth difficult and painful, and in marked cases the teeth can hardly be separated. The tongue is coated with a thick white fur, and the breath is generally intolerably fetid; speech becomes almost unintelligible, as much from the inability to move the jaws as through the interference presented by the swollen tonsils to the passage of air, and the inflammatory paresis of the soft palate. The hearing is frequently obtunded on account of the extension of the inflammation to the posterior nasal cavity and the Eustachian tubes, this being occasionally complicated with abscess of the ear. As the disease progresses, the local pain becomes more and more severe, being sharp and lancinating, and frequently extending to the ears; deglutition, even of the saliva, is so excruciating, that the patient prefers to allow it to dribble out of his mouth. In parenchymatous tonsillitis with tendency to abscess, the suffering is very great, and the relief is proportionately marked when the latter opens of its own accord, or with the assistance of the surgeon's knife. The cervical glands are enlarged and hardened, and the entire anterior portion of the neck occasionally appears puffed up and swollen.

The impossibility of opening the patient's mouth soon after the early symptoms of the affection renders examination of the inflamed tonsils very difficult, and the diagnosis has frequently to be made without the benefit of this source of information. The inability to separate the jaws, the fetid breath and the coated tongue, and the comparatively slight systemic disturbance, are pretty sure evidence of the trouble, with which other affections could hardly be confounded. When the diagnosis is uncertain, much information can be gained by introducing the index finger into the mouth as far as the tonsils; the organ will feel hard and prominent, while pressure upon it will increase pain intensely. The presence of pus can at the same time be ascertained, as indicated by Stoerk, by placing the fingers of the other hand behind and below the ramus of the lower jaw, and compressing the tonsil between the finger in the mouth and those outside. In tonsillitis with folliculous exudation, the organ is generally soft to the touch, while a strong light thrown in between the partly opened jaws, will reveal white spots which contrast markedly with the surrounding redness, and are frequently mistaken for diphtheritic patches. The differential diagnosis between them, however, can be established without great difficulty by introducing the end of a probe (appropriately curved near the extremity for the purpose) into each crypt. Diphtheritic pseudo-membrane is leathery and resisting, while the follicular exudation is so soft that the end of the probe will easily penetrate through it, into the crypt, and generally detach a small portion of cheesy substance. The color of the latter differs also, being much whiter than in diphtheria, the membrane of which has a blackish tint.

Prognosis.—Death, as a result of tonsillitis, very rarely takes place. Rupture of the tonsillar abscess and asphyxiation by the escaping pus; pyæmia, which may occur in a debilitated constitution; extension of the inflammation to the larynx with œdema as a sequel, are, however, dangers which should be borne in mind.

Treatment.—We fortunately possess, for this affection, a remedy which has certainly not been overestimated, and which, in my hands, has not as yet failed to cut an attack short if administered early. In erythematous as well as parenchymatous and folliculous tonsillitis, guaiacum can be termed a specific. The method which I usually follow in administering it, is to prescribe the ammoniated tincture, one teaspoonful in a half glassful of milk, and to order the patient to first gargle with a mouthful of the solution, then to swallow it. Enough of the powder to cover a penny is then placed far back on the tongue, the sufferer being directed to keep it there as long as possible. When the fever is high, tincture of aconite root, in drop doses every hour, is most effective, assisting at the same time in diminishing the local congestion. In erythematous tonsillitis, lozenges containing two grains of the resin of guaiac are generally sufficient to avert the inflammatory process.

When the affection has progressed for some time, *i.e.*, more than two or three days, guaiac is no longer useful. Of late I have been using injections into the inflamed masses, of a ten per cent. solution of cocaine, using an ordinary hypodermic syringe with a long needle. The pain is not only greatly reduced locally, but also in all the adjoining parts. It seems to curtail the duration of the attack, and to prevent suppuration. The injections should be applied at least twice daily.

Great relief may be obtained, when the tonsils are much inflamed, by free depletion, a long, sharp bistoury being used to make a series of cuts. Five or six stabs are generally sufficient to cause quite a flow of blood. In most cases, however, this procedure can only be conducted with great difficulty, on account of the half-closed mouth.

When suppuration cannot be arrested, warm applications not only hasten the formation of the abscess, but they also decrease the pain. Water, used as a gargle, as hot as it can be borne, is very efficient; warm poultices, applied externally over the tonsils, also produce a sedative effect; the inhalation of steam, medicated with opium, belladonna, conium, or benzoin, can also be employed, but the suction necessary in ordinary inhalers, entails some pain. This can be avoided by using a steam atomizer on the principle of that shown in Fig. 79. As soon as fluctuation can be distinctly felt by internal and external digital pressure, it is better to evacuate the abscess than to allow it to open itself, lest it burrow in the surrounding parts and cause dangerous complications. The best means to accomplish this, is to apply the index finger of one hand over the seat of fluctuation, the point of the bistoury being slipped alongside and pushed into the tonsil, beneath the tip of the finger resting over the abscess. The patient's head should be tilted forward so as to enable the pus to run out of the mouth instead of in the larynx or œsophagus.

In folliculous tonsillitis, the general indications are the same. The guaiac treatment can also be used with advantage when the patient is seen early. Generally, however, the case is not seen until two or three days after the onset of the affection. The treatment recommended by Bosworth, of New York, has also proven of the greatest value in my hands, two drachms of tincture of the chloride of iron in two ounces of glycerine being given in drachm doses every two hours, without water. It makes a nice golden-brown mixture, which is quite palatable. It acts as a local astringent in passing over the inflamed tonsils, decreasing markedly the local congestion while modifying the action of the follicles.

Frequent gargling with lime water is very effective in removing the exudation, and if used every half hour or so, its accumulation can be prevented, thus contributing greatly to the patient's comfort. Untreated, an attack of folliculous tonsillitis generally lasts from six to ten days.

HYPERTROPHY OF THE TONSILS.

Etiology.—Hypertrophy of the tonsils is generally met with in children and young persons, being rarely seen after the fortieth year, on account of the tendency of these organs to disappear gradually after the age of thirty. A scrofulous diathesis predisposes to it, while certain diseases, such as diphtheria, scarlatina, etc., may also cause it, sometimes almost spontaneously. Repeated inflammatory processes, such as successive attacks of acute pharyngitis, in which the tonsils are involved, occasionally act as a cause. In some cases, the hypertrophic process cannot be traced to any distinct etiological factor, the subject being apparently in perfect health.

Pathology.—As in hypertrophy of the glandular tissue of the naso-pharynx, the lymphatic element which forms an important part in the anatomy of the tonsils, is probably causative in the maintenance of the early inflammatory process which forms the primary step to the hypertrophic changes. When these have progressed for some time, the epithelial layer is greatly thickened, and the mucosa under it is permeated with lymphatic cells and new tissue elements. The size of the tonsils is principally increased by the proliferation of new connective tissue, interspersed with bundles of fibrous tissue, while their density or hardness depends upon the degree of organization which these tissues have reached.

Symptoms.—The increased volume of the tonsils may be hardly noticeable, or their increase in size may be so great as to cause them to touch. One organ alone may be hypertrophied, but, as a rule, both are involved in the process. Moderately enlarged, the tonsils generally occasion but little if any trouble. In many cases their presence is unknown until they have attained sufficient size to offer mechanical impediment to the physiological functions of the pharynx. In children their presence often occasions a diseased condition of the surrounding parts, without in themselves presenting active symptoms. Their volume diminishing the lumen of the pharynx, the passage for the respired air is diminished in proportion, and the patient keeps his mouth open and breathes through it to compensate for the deficiency of the current inhaled through the nose. A catarrhal condition of the latter is engendered through the accumulation of secretions on account of the limited air-blast to discharge them, while the mouth and throat are kept dry and exposed to the action of what foreign particles may be present in the atmosphere. The features sometimes acquire a silly expression, the voice is muffled and devoid of resonance, snoring and disturbed sleep and dysphagia are complained of, while all the other subjective and objective symptoms of a chronic catarrhal inflammation of the nose and throat may be present, complicated in some cases with impaired hearing, through involvement of the Eustachian tubes. Frequent recurrences of acute tonsillitis are the rule. The obstruction to free respiration rendering an imperfect action of the thorax obligatory, its development is not properly accomplished, and deformity of the chest results in many cases, that form called "pigeon-breast" being the most common. Imperfect oxygenation is a natural consequence, and the child attains his maturity, in a weak state of health, to be easily influenced by all causes of disease. Infants are in some cases unable to take the breast, sucking being rendered very difficult.

In some cases the lacunæ are almost continuously filled with masses of cheesy secretion, which decomposes *in situ* and evolves a very fetid odor, contaminating the breath and the inspired air.

When the tonsils become enlarged in grown subjects. the deleterious effects are not so marked, the pharyngeal cavity being much more spacious and only influenced mechanically when they have attained a very large size. Then the subjective symptoms described may take place, the most frequent complication being posterior nasal pharyngitis and folliculous pharyngitis. Acute tonsillitis, especially the folliculous variety, is also common in these cases.

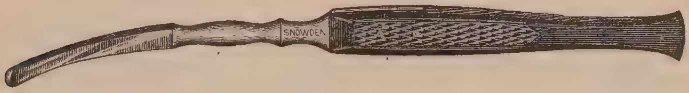
Prognosis.—As already stated, enlarged tonsils generally return to their normal size after the thirtieth year. In themselves, they therefore offer no likelihood of proving dangerous to life, and it is only through the complications which they induce that their presence can present an unfavorable prognosis.

Treatment.—Active treatment for the reduction of hypertrophied tonsils is always indicated when they are sufficiently large to occasion complications or to interfere with proper respiration through the nose. In adults, however, the likelihood of their spontaneous disappearance should be remembered and the treatment should be more medicinal than surgical, unless frequent attacks of tonsillitis renders surgical procedures peremptory.

Repeated attempts to reduce hypertrophied tonsils by means of astringents, have, in my hands, failed to produce anything but a very slight diminution in their bulk. Nitrate of silver solution instead of causing a decrease in their size, seemed to cause an increase, a fact theoretically explained by the stimulation induced by this agent and its tendency to encourage the formation of new elements. The solid stick, however, a portion of which is dissolved on the end of a heated wire, which is then introduced into the lacunæ, may be used with good effect. Powdered alum and tannin, equal parts, applied with the insufflator, seemed to be productive of what benefit was obtained by means of astringents. Iodine and ergotine did not seem to affect the glands at all.

When, for some reason or other, the tonsil cannot be amputated, the best method, in my opinion, is that of Donaldson, of Baltimore, who makes small incisions into it and inserts a crystal of chromic acid into each cut. Galvano-cautery is also effective when the tonsils are soft, a few deep cauterizations in each tonsil being repeated about twice a week. Morell Mackenzie recommends London paste, applied once or twice a week, according to circumstances, over different parts of the organ. The treatment, although effective, is very painful and tedious.

Fig. 70.



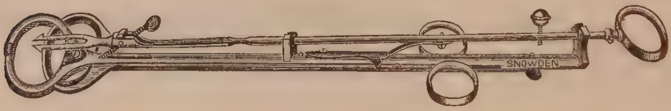
Tonsil bistoury.

Amputation of the tonsils can be performed by means of the bistoury, the tonsillotome, the wire snare, and the galvano-caustic snare. The operation with the bistoury can be employed very satisfactorily in adults, but not in children, on account of the resistance which the latter usually offer, and the danger of cutting the surrounding parts. An ordinary probe pointed bistoury, with a long shaft, may be used for the purpose.

The tongue being depressed by an assistant, a volcella forceps is fastened on the tonsil and held with the one hand; with the other, the bistoury is introduced under the tonsil and a couple of sweeps from below upwards are made until it is cut half-way through. The instrument is then withdrawn and placed over the organ, and an incision is made from above until the first cut is reached. As generally performed, *i.e.*, cutting down from above until the tonsil is detached, there is always danger of cutting the parts below the level of the tongue, especially when, as frequently happens, the tonsil extends far down.

The operation by the tonsillotome presents none of the dangerous features of that of the bistoury, and can be performed without assistant. Mathieu's tonsillotome, shown in Fig. 71, is a very convenient and satisfactory instrument. Its oval fenestrum encircles a large tonsil accurately and its fork raises the organ from its bed. Approximation of the thumb and finger-rings then causes penetration of the cutting blade through it, and the piece comes off adhering to the fork.

Fig. 71.



Mathieu's tonsillotome.

For my own use, I had constructed the instrument represented in Fig. 72, which is so disposed as to be applicable to any degree of hypertrophy. It is somewhat smaller than Mathieu's, and the general conformation of the blades is preserved; but, instead of being furnished with a side-shaft for the fork, the spear which takes the place of the latter is attached to the main shaft by means of a thumb-screw. The lower edge of the spear is straight throughout one-half of its length, then oblique, and rests in a grooved guide-screw which passes through a slot in the shaft and is fastened to the blade. When in action, it perforates the tonsil and draws it out without causing the jar occasioned by the sliding-screw of Mathieu's. A spear is made to replace the fork, to avoid the difficulty generally experienced in separating the cut-piece from the latter; it holds it sufficiently to prevent its dropping into the throat, and can be easily withdrawn when partly in the tonsil, should a calcareous concretion be met with.

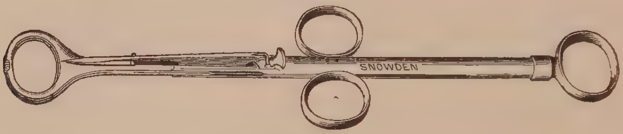
The thumb-ring is screwed on the main shaft, bringing it in a direct line with the finger-rings. By this arrangement the equilibrium of the instrument is maintained during the operation, whether operating on the right or the left tonsil.

The main shaft is not continuous with the blade-rings, as in Mathieu's; they are separate, and the latter are furnished with rods which fit and move easily in longitudinal grooves extending an inch and a half along the side of the shaft. By this arrangement any size of blade or ring can be adjusted to the shaft, in each case the rings fitting tightly around the tonsil, a desideratum for a neat operation and an even surface.

As represented in Fig. 72, the instrument is ready for the operation. When the thumb-ring and finger-rings are approximated, the spear enters the tonsil and the beveled end of the main shaft slips under a small spring situated near the grooved guide-screw, from which a pin, reaching down to the blade, protrudes. The spring being raised, the pin is lifted out of the hole in the blade, setting it free, and the knife, following the motion of the fingers, cuts through the tonsil.

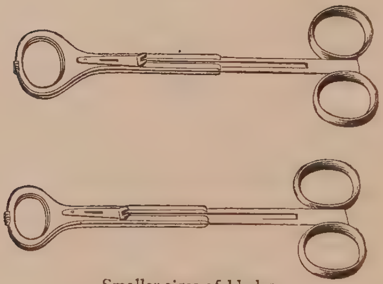
One of the annoying features of tonsillotomes in general is the difficulty attending their cleansing. In this instrument, traction on the blade-rings with the left hand will cause them to slip half-way out of the shaft, until a pin, projecting from the lower surface of one of them, becomes engaged in a "safety" groove near the end of the knife. The finger-rings are now pushed away from the thumb-ring, causing the blade to occupy the position it held before the operation. The rings being thus allowed to slip farther out, they become disengaged from the shaft, leaving the

Fig. 72.



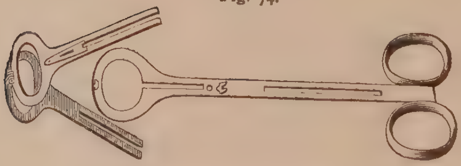
Author's tonsillotome.

Fig. 73.



Smaller sizes of blades.

Fig. 74.



Blade and rings separated.

blade exposed. The tip of the spear is now turned aside by lifting it out of the grooved guide-screw and the piece of tonsil taken off. Each exposed part can be cleansed thoroughly and readjusted in a few seconds. If necessary, the whole instrument can be taken apart by merely unscrewing the thumb-ring.

The operation with the tonsillotome is very simple. The tongue being depressed with the left hand, the instrument is introduced flat-wise into the mouth until the two rings are on a level with the tonsil. A slight turn of the instrument on its axis will then bring the ring over the tonsil, against which it should be pressed gently. The fingers and thumb-rings being then approximated, the tonsil is perforated by the lance and cut off. The pain produced is generally slight and lasts but a short time. Bleeding usually follows, but it almost always stops after a few seconds, especially if a gargle of ice-water is used. Occasionally it lasts longer, stopping spontaneously in ten or fifteen minutes. Profuse hemorrhage occurs in perhaps one out of every five hundred operations, while an alarming flow does not occur in one out of a thousand. It has been my misfortune to meet with two such cases; in one, a medical student, seven consecutive hemorrhages at from three to fifteen hours' intervals, occurred, pressure alone, of all the means employed, acting satisfactorily. In the second case, a boy of seventeen, the bleeding occurred two hours after the operation, and torsion of the tonsillar artery was resorted to with success. Before I had these two cases, I was inclined to consider the danger of hemorrhage as overrated; since then, I have come to the conclusion that I was wrong, and that the likelihood of its occurrence should be borne in mind, especially since a number of cases are on record in which a fatal result could not be prevented. Hemorrhage is more to be feared in adults than in children; the vessels being larger, the clots cannot as rapidly cause occlusion, while the less elastic arterial walls are collapsed with greater difficulty. In my two cases of profuse hemorrhage, the tonsils were exceedingly hard to penetrate, a fact which led me to believe that the cut arteries were maintained open by the surrounding fibrous elements adhering to them. I am therefore inclined to consider hemorrhage more likely in hard than in soft tonsils.

Prior to operating, I now introduce into the parenchyma of the tonsil, with an hypodermic syringe, as much as I can of a ten per cent. solution of cocaine; its constricting action upon the blood-vessels renders the organ comparatively exsanguine, preventing almost entirely the usual slight bleeding, and limiting the likelihood of subsequent hemorrhage. The slight pain incident upon the operation is also prevented.

Dr. Mackenzie's tanno-gallic acid gargle is an excellent mixture for the prevention of secondary hemorrhage. It is composed of six drachms of tannic acid and two drachms of gallic acid in an ounce of water; half a teaspoonful of this mustard-like liquid being slowly sipped at short intervals, it penetrates into the cut surface, assisted by the act of deglutition. Amputation by the snare is a rather slow process as compared with that by the tonsillotome, but what danger of hemorrhage may exist is much diminished. The loop being passed over the tonsil, the wire is gradually drawn home, fifteen to twenty minutes being employed. In some cases the growth is sessile, and cannot be grasped; a long needle may be used to transfix it, as in large anterior nasal hypertrophies (see Fig. 36). The galvano-caustic snare is manipulated in the same manner but the operation can be performed more rapidly. Cocaine is of great assistance in these operations and should invariably be employed as indicated above.

In some cases, the enlarged tonsil is found adhering to the sides of the pillars with which it is in contact. It should be detached before the operation, by slipping the end of a probe between pillar and tonsil until these are separated.

The after-treatment of these operations is of the greatest simplicity. The cut surface heals in a few days, without causing, in most cases, the least systemic disturbance. Highly seasoned articles of food should be avoided, as well as hot liquids.

Systemic treatment is important in many cases. Scrofula should be met with appropriate remedies, such as the iodides, hypophosphites, and general tonics. Anemia, which is a frequent result of hypertrophic tonsils of long standing, through imperfect oxygenation of the blood, is best treated with Rabuteau's pills of iron, permanganate of potash or arsenic. In short, all existing abnormal conditions should receive proper attention.

RELAXATION OF THE SOFT PALATE AND UVULA.

(Synonyms :—Elongated Uvula; Relaxed Throat; Relaxed Throat and Uvula.)

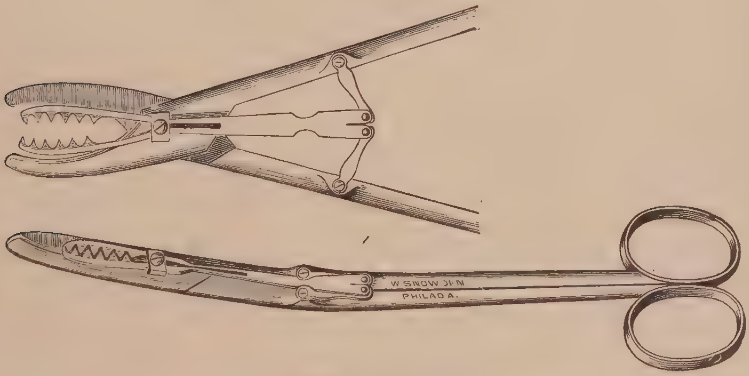
Etiology.—Relaxation of the soft palate and uvula is generally due to chronic catarrhal inflammation of the posterior nasal cavity and of the pharynx. In the former, the relaxation is not only due to extension, by continuity of tissue, of the inflammatory process, but it is mainly caused, in my opinion, by the constant hacking and scraping to which these cases become accustomed in their efforts to clear the vault of offending discharges. A relaxed and weakened condition of the system, through loss of tone of the muscular power, is also a frequent cause, the azygos uvulæ and palatal muscles taking part in the general debility, and allowing the palate and uvula to drop perpendicularly on the base of the tongue, where they are kept congested by the efforts of the patient to dislodge a supposed foreign object. Gastric affections, immoderate smoking and drinking, are also frequent causes, while cerebral affections and diphtheria, by causing paralysis of the soft palate, may cause it to appear relaxed.

Pathology.—In elongation due to catarrhal inflammation, there is at first mere congestion, the blood-vessels being engorged and the cellular tissue somewhat œdematous. Gradually, there is inflammatory infiltration, which finally becomes organized, and the enlargement, which at first was fugitive, is made permanent. The relaxation may implicate the soft palate and the uvula, or the latter only.

Symptoms.—A tickling, irritating sensation, which induces frequent fits of coughing, is experienced in the majority of cases. A feeling as if a foreign body were in the throat causes the patient to make violent efforts, by hacking, to clear his throat. Nausea is a frequent symptom, most marked on rising, the upright position causing the uvula to rest against the base of the tongue. Upon lying down, it falls back upon the posterior wall of the pharynx, and maintains a constant irritation, which soon establishes a chronic inflammatory process. Snoring is usually marked, and the sleep is disturbed by the obstruction presented to normal respiration by the relaxed palate, which acts like a valve, allowing the air to pass downward, but interfering with its expulsion. When the uvula is very long, it may cause spasm of the glottis, and, according to Bosworth, genuine spasmodic asthma. The tongue is usually coated at the base by a yellowish-green fur, which resembles that caused by hepatic engorgement. In some cases, the hacking cough, the irritable throat, and the increased salivary secretions affect the patient's health greatly, and he may appear as if suffering from a much more formidable affection.

Treatment.—When the relaxation involves the soft palate only, astringents are sometimes quite effective, but they must be used in strong solution. Alum is about the most effective agent we possess; in the proportion of gr. xx–℥j; it may be used as a gargle every two or three hours, generally with the happiest results. Ferric alum, sulphate of zinc, and tannin, may also be used with good effect in solutions of gr. xv–℥j. When this does not succeed, or when the relaxation is limited to the uvula, ablation of the latter is the only satisfactory measure. This may be accomplished with a pair of long, curved scissors, the uvula being steadied with a pair of suitable forceps. This procedure, although apparently easy, is sometimes quite difficult, owing to the constant up and down motion of the uvula. Again, the scissors, in closing, allow the organ to slip out of its grasp, after cutting perhaps half-way through it.

Fig. 75.



Author's uvulatome.

A much more satisfactory instrument is that shown in Fig. 75. It consists of a pair of strong scissors with the handles slightly bent. Its lower surface is armed with a pair of toothed claws, the stems of which are united, and are connected with the handles by means of two little arms. These being attached loosely, the claws have free longitudinal motion, being guided by the pivot-screw of the scissors, and kept in position by a cap which not only serves that purpose, but also approximates the toothed edges of the claws by the resistance it offers to their outer edge, as they are drawn backward by the approximation of the handles.

The instrument being held with the palm of the hand directed toward the operator, that is to say, with the thumb and finger passed through the rings from below upward (the bend being just sufficient to prevent them from interfering with the line of vision) it is introduced closed into the mouth. As soon as the point has reached the uvula, the rings are separated, and the organ hangs between the teeth of the claws. The rings being now approximated, the claws close on the uvula *before* the blades touch it, hold it fast, and bring it forward by bending it at its base. The scissors cutting it in that position, the cut surface is oblique and posterior. When food is swallowed, the horizontal surface obtained with other instruments is exposed to the bolus, and scraped and kept sore by it for several days. With the posterior oblique surface obtained with this instrument, the bolus only touches the anterior surface of the stump, the cut surface resting against the pharynx. The healing process is more rapid, and a better stump is obtained; slipping of the uvula between the blades is impossible, and the cut is always complete.

A ten per cent. solution of cocaine, applied just before the operation, renders it almost painless, and prevents the slight bleeding which usually occurs. The after-effects of the operation are slight local pain, increased by the act of deglutition. Well-seasoned food, hot liquids, and smoking, should be avoided. An occasional application of a four per cent. solution of cocaine during the day limits markedly the unpleasant after-effects and promotes resolution of the cut surface.

CHAPTER XXI.

THE LARYNX.

ANATOMY.

THE larynx may be considered as an expansion of the upper portion of the trachea or windpipe, which lies between the pharynx, of which it forms the anterior wall, and the lower portion of the base of the tongue. Its superior aperture slants toward the pharynx, and is covered by a leaf-like lid, the *epiglottis*, which is attached to its anterior margin and closes from before backward. The larynx is connected with the surrounding parts by muscles and ligaments, the former of which serve to elevate it during deglutition and phonation. It forms in the neck, the prominence generally called "Adam's apple."

Although the larynx is in shape an expansion of the trachea, its framework is not like that of the latter, composed of cartilaginous rings, but its walls are formed by two broad plates of cartilage, which meet anteriorly and are widely separated posteriorly, thus forming a triangular space between them, with its base facing the pharynx. United in this manner, they form the *thyroid cartilage*, called so on account of its resemblance to a shield.

The anterior angle of the thyroid cartilage is hardly more than an inch from above downward, a deep depression in its superior margin diminishing its perpendicular diameter greatly. Posteriorly, however, this diameter is much greater, each wing being furnished with two perpendicular horns or *cornua*, one above and the other below, the former being somewhat longer and thinner than the latter, which is short and thick. The upper horns are connected with the hyoid bone above by means of ligaments. The two lower horns might be called the pillars of the thyroid cartilage, as they form its posterior support, resting upon the two facets of the cricoid cartilage, immediately below.

The *cricoid cartilage*, called so on account of its resemblance to a seal ring, separates the thyroid cartilage from the trachea, its seal or broad portion being turned towards the pharynx. On each side of the seal is a small prominence, which in turn is furnished with a small hollow facet. In the two facets thus formed, rest the inferior cornua of the thyroid cartilage, which are held in place by means of a capsular ligament, so disposed as to allow approximation of the two cartilages anteriorly.

While the sides of the seal-like portion of the cricoid cartilage support the inferior cornua, its upper border becomes the resting point of two other cartilages, the *arytenoid cartilages*, which stand some distance from the median line. Each cartilage is pyramidal in form, its antero-posterior diameter being much longer at the base than its lateral, and resembles greatly in shape the pointed paper hats made by children. Like the cornua of the thyroid, the arytenoid cartilages rest upon facets, to which they are secured by ligaments, in such a manner as to be freely movable; resting upon these facets, as they do, only by a small portion of their inferior surface, near the middle, they can be pivoted upon their support like the needle of a marine compass, and even be slipped up towards the median line.

In the rotatory faculty of the arytenoid cartilages, we have the mechanical basis for the adduction and abduction of the *vocal bands*, wrongly called the vocal cords (not being rounded cords as the name would imply), which are two thin but strong bands of yellow elastic tissue, covered on their surface by a thin layer of mucous membrane, and attached anteriorly to the retiring angle of the thyroid cartilage near its lower border, and posteriorly to the anterior angle of the base of the arytenoid cartilage. The manner in which approximation and separation of the vocal bands is accomplished is as follows:—

Abduction.—The posterior aspect of the seal of the cricoid cartilage presents two shallow depressions, one on each side of the middle line, which serve for the attachment of the *posterior crico-arytenoid* muscles, whose fibres are directed upward and outward and are inserted at the posterior angle of the arytenoid cartilage. When these muscles contract, they approximate these posterior angles, and the anterior angles of the arytenoid cartilages are rotated around, separating their extremities. The vocal bands being attached to the latter, are also widely separated, the triangular open space between them being called the *glottis.*

Adduction.—To approximate the vocal bands, we have another set of muscles, the *lateral crico-arytenoidei*, whose broad attachments are on the upper border of the narrow or ring portion of the cricoid, while their fibres, which are directed upward and backward and somewhat inward, are also inserted at the posterior angle of the arytenoid. Contraction of these muscles causes the antagonizing action to that of the posterior crico-arytenoidei, and by pulling the posterior extremities of the arytenoid cartilage outward, they cause approximation of the bands. In death, or when both sets of muscles are paralyzed, the muscles are neither completely approximated or separated; they remain half way, in the so-called "cadaveric" position.

The lateral cricoid-arytenoid muscles are not sufficient, however, to cause approximation of the whole length of the bands. A delicate piece of soft cartilage which is imbedded in each vocal band and attached also to the anterior angle of the arytenoid cartilage, called the *vocal process*, limits the action of the bands, and when the lateral crico-arytenoidei alone act, their points come together with the portion of the cords anterior to them, leaving a triangular opening behind. In order to close this, when necessary, there is another muscle, the *arytenoideus*, composed of three sets of fibres, two oblique and one horizontal, which is attached to the internal surface of each arytenoid cartilage, and which, by contracting, approximates the cartilages by causing them to slide upward, upon their facets, thereby approximating that part of the vocal bands containing the vocal processes and consequently the entire length of the bands.

The vocal bands are thus *opened* by the *posterior crico-arytenoidei*, *partially closed* by the *lateral crico-arytenoidei*, and *completely closed* by the *arytenoideus;* thus making three sets of muscles concerned in opening and closing the glottis.

Extension.—Extension of the vocal cords is produced by the tilting upward of the cricoid cartilage upon the thyroid, the articulation of the inferior cornua of the thyroid cartilage and the cricoid serving as fulcrum. The part of the seal upon which the arytenoid cartilages are attached being much higher, comparatively, than the location of the fulcrum, when the anterior portion of the cricoid cartilage is raised, the upper border of the seal is forced back, drawing the arytenoid cartilages with it, and stretching the vocal bands which are attached to them. The muscles which accomplish this purpose are the *thyro-cricoidei*, composed of two fasciculi on each side, which are attached to the external surface of the thyroid cartilage near its lower edge, and, being directed forward and downward, are inserted upon the external surface of the cricoid. When these muscles contract they draw the cricoid cartilage upward under the thyroid, stretching slightly, at the same time, the anterior portion of the trachea.

Relaxation.—Relaxation of the vocal bands after the thyrocricoid muscles have extended them, is accomplished by the *thyro-arytenoidei* or vocal muscles, each composed of three fasciculi, mainly by approximating the arytenoid cartilages and the thyroid cartilage. The first or straight fasciculus is composed of flat horizontal fibres which are closely connected with the vocal band, and are inserted into the inferior border of the arytenoid cartilage. The second is triangular in shape, the base of the triangle being attached to the anterior surface of the arytenoid cartilage, while the third fasciculus is also triangular in shape, the apex being attached to the inferior border of the arytenoid, while its base is inserted at the point of common origin in the retiring angle of the thyroid cartilage, sending diverging fibres to the sides of the cavity from origin to insertion.

The vocal bands are thus *extended* by the *contraction* of the *thyro-cricoid muscles*, and *relaxed* by the *contraction* of the *thyro-arytenoidei*, a perfect equilibrium being maintained between the two sets of muscles so as to insure absolute steadiness in the production of tones. Another important set of muscles is that which causes the descent of the lid of the larynx, the epiglottis, and which contracts, and even closes in some cases, the upper aperture of the larynx.

Depression of the Epiglottis.—The epiglottis is maintained raised some distance from the laryngeal aperture principally by a ligament which connects its upper surface with the base of the tongue, the *glosso-epiglottic ligament.* The ordinary position of the epiglottis during respiration is to stand a certain distance above the larynx, but when food or drink is swallowed, it is closed upon the larynx to prevent the ingression into it of the liquids or solids taken. This is accomplished by the *thyro-epiglottideus*, a small muscle which is inserted on each side of the epiglottis, and attached to the inner surface of the thyroid cartilage. Its contraction causes the epiglottis to adapt itself closely to the aperture of the larynx, which it closes securely.

Contraction of the Laryngeal Aperture.—The muscles which contract the aperture of the larynx, and are capable of closing it completely in case of loss of the epiglottis, are the *superior aryteno-epiglottidei*, which arise from the apices of the arytenoid cartilages, and curving around in the fold of mucous membrane forming the edge of the laryngeal aperture, the ary-epiglottic fold, into which the greater portion of their fibres are lost, are finally inserted at the base of the epiglottis. Their contraction causes approximation of the upper portion of the laryngeal cavity and holds the office of the epiglottis when this is gone. In order to further secure the integrity of the larynx during deglutition, a third mechanism enters into play. Immediately below the edge of the laryngeal aperture and a short distance above the vocal bands, are the *ventricular bands*, sometimes called the false vocal cords, which extend from the receding angle of the thyroid cartilage to the anterior surface of the arytenoid cartilages, parallel with the true vocal cords. They are formed by the *superior thyro-arytenoid ligament* and some muscular fibres. Just before the epiglottis comes down on the larynx, the ventricular bands are approximated, the *cushion of the epiglottis*, a pad-like thickening upon its under surface, filling the gap between it and the ventricular bands and closing the slit between the latter effectively.

Lubrication of the Vocal Bands.—Between the ventricular band and the vocal band on each side, is an elliptical space, the *ventricle*, which extends antero-posteriorly from the thyroid to the arytenoid cartilage, and forms a sort of pocket between the ventricular band and the wall of the larynx. Into it opens the *laryngeal sac*, an upright cavity, which is really but an extension upward of the ventricle, about the size of a small bean. The mucous membrane lining this sac is thickly studded with small racemose glands, which are constantly pouring out a glairy mucus that keeps the cords lubricated. The ventricle being situated between the internal wall of the larynx and the ventricular band, it is in a favorable position to be compressed, this being accomplished by the contraction of the *inferior aryteno-epiglottideus* (compressor sacculi laryngis of Hilton), which arises from the anterior angle of the arytenoid cartilage, and is inserted into the margin of the epiglottis, after having passed over the sac, through the ventricular band.

The larynx is united with the surrounding parts by means of muscles and ligaments. The former, which are called the *extrinsic* muscles (in contradistinction to those which unite the different parts of the larynx together—the *intrinsic* muscles), move the larynx up and down in the throat during phonation and deglutition, and maintain it steady during the emission of sound.

Elevation is accomplished principally by the *thyro-hyoid* muscles, which are attached to the hyoid bone and to the upper portion of the thyroid cartilage. These are principally instrumental in insuring the steadiness of the larynx, which they raise during phonation. In the production of low tones, the larynx is depressed by the *sterno-thyroid* muscle which connects the sides of the thyroid cartilage with the sternum.

The Laryngeal Mucous Membrane.—The different parts described, comprising the framework and muscular supply of the larynx, are, throughout their entire extent, covered with mucous membrane. Between the epiglottis and the tongue, it forms three folds,—the *glosso-epiglottic* folds—one exactly in the middle, forming the *glosso-epiglottic* ligament, before alluded to, and two lateral, which form between them two shallow fossæ into which foreign bodies frequently become impacted. On each side of the epiglottis the mucous membrane forms another fold, the *pharyngo-epiglottic* fold which unites the epiglottis to the pharynx. This forms on each side the upper limit of another cavity, the *pyriform sinus*, much deeper than the glosso-epiglottic fossæ, which are also frequently invaded by foreign bodies.

The upper border of the larynx is formed by a reduplication of the membrane called the *ary-epiglottic fold.* The membrane is here loosely attached to the underlying parts, especially in the region of the arytenoid cartilages, which are thus enabled to rotate freely. Over the ventricular bands it is somewhat more adherent, but again becomes loose in the ventricle. The laxity of the membrane in these situations renders them more liable to œdema than other parts. It adheres firmly to the vocal cords, forming a sharp edge at their border, then continuing obliquely downward to the trachea.

The *epithelium* is principally of the *ciliated* variety. The vocal bands, however, are covered along the edge and a short distance beyond, by *pavement* or tesselated epithelium, the cells being especially large. The posterior surface of the epiglottis and the inter-arytenoid space are also lined with pavement epithelium.

Arteries.—The larynx is supplied by branches of the *superior* and *inferior thyroid* arteries. The *superior laryngeal* which is derived from the former, penetrates into it by passing through the thyro-hyoid membrane. The *middle laryngeal*, also a branch of the superior thyroid, passes over the thyro-cricoid membrane and unites with its fellow, after having sent a branch into the laryngeal cavity. The *inferior laryngeal*, a secondary branch of the inferior thyroid, sends a branch to the posterior crico-arytenoid muscle, while another meets with a branch of the superior laryngeal.

Nerves.—The nervous supply of the larynx is derived from the *superior* and *inferior* or *recurrent laryngeal*, both branches of the pneumogastric. The former is a sensory nerve almost exclusively, supplying motor nerves only to the *thyro-epiglottidean*, *ary-epiglottidean*, and *crico-thyroid* muscles. The recurrent laryngeal is exclusively a motor nerve and sends branches to all the muscles of the larynx, with the exception of the three enumerated.

PHYSIOLOGY.

The principal physiological function of the larynx is the production of voice. During respiration the vocal bands are separated, this separation being especially marked during the inspiratory act, when the posterior crico-arytenoid muscles approximate as closely as possible the posterior processes of the arytenoid cartilages, thus *abducting* the vocal bands to their utmost extent. In expiration, however, these muscles cease to act, and the vocal bands are maintained separated by the current of expired air which forces them apart. If now a sound is to be emitted, in connection with the expired current, another set of muscles is brought into play, the lateral crico-arytenoidei, which pull the posterior processes of the arytenoid cartilages outward, and cause *adduction* of the vocal bands, leaving a mere slit between them. The air impinging upon the edge of the bands, causes them to vibrate, just as the tongue of a

PLATE VII.

PLATE VII.

ANATOMY OF THE LARYNX.

FIGURES 1 TO 9.

a. Thyroid cartilage.
b. Cricoid cartilage.
c. Arytenoid cartilage
d. Cartilage of Santorini
e. Crico-thyroid membrane.
f Vocal band.
g. Arytenoideus muscle.
h. Lateral crico-arytenoid muscle.
i. Posterior " "
j. Epiglottis.
k. Vocal process

m Cartilage of Wrisberg.
n. Aryteno-epiglottic fold.
o^1 Upper fasciculus of thyro-arytenoid muscle.
o^2. Middle " " " "
o^3. Lower " " "
p. Ventricle of the larynx.
q. Laryngeal sac.
r. Ventricular band
s. Superior aryteno-epiglottic muscle.
t & t^2. Two fasciculi of thyro-cricoid muscle.
u. Superior thyro-arytenoid ligament.

ABDUCTION AND ADDUCTION.

FIG. 1.

POSTERIOR VIEW.

Vocal bands abducted by contraction of posterior crico-arytenoids (arytenoideus cut off).

FIG. 2.

LATERAL VIEW.

Section of larynx showing relation of adductor and abductor muscles.

FIG. 3.

POSTERIOR VIEW

Vocal bands adducted partially by contraction of lateral crico-arytenoids (arytenoideus not having acted).

FIG. 4. FIG. 5.

HORIZONTAL SECTION OF LARYNGEAL FRAMEWORK, ABOVE VOCAL BANDS.

Vocal bands in abduction.

Vocal bands in partial adduction.

EXTENSION AND RELAXATION.

FIG. 6.

LATERAL SECTION.

Relaxation of vocal band through contraction of thyro-arytenoids and relaxation of thyro-cricoids.

FIG. 7.

LATERAL SECTION.

Interior of larynx. Flaps raised to show laryngeal sac, and the relation of muscles with the mucous membrane.

FIG. 9.

ANTERIOR SECTION.

Interior of larynx and relation of muscles.

FIG. 8.

LATERAL SECTION.

Extension of vocal band by elevation of the cricoid cartilage through contraction of the thyro-cricoid muscles and relaxation of the thyro-arytenoids.

FIG. 10.

INNERVATION OF THE LARYNX.

Posterior section of neck and upper part of chest showing the course of the pneumogastric nerves, their branches, and their relations. Lateral half of trachea and quarter of larynx cut off.

A & A^1. Pneumogastric nerve.
B & B^1. Superior laryngeal.
C. Right recurrent laryngeal.
D. Right lung.
E. Left recurrent laryngeal.
F. Branch of superior laryngeal
a. Œsophagus.
b. Aorta.
c. Pulmonary artery.
d. Trachea.
e. (Upper) Internal jugular vein cut off.
e. (Lower) Bronchi.
f. Arytenoid cartilage.
g. Subclavian artery.
h. Common carotid artery.
i. External " "
j. Internal "
k. Base of cranium.
m. (Upper) First cervical vertebra.
m. (Lower) Arytenoideus muscle.
n. Pharynx cut off from upper attachments.
o. Epiglottis.
p. Hyoid bone.
q. Thyroid cartilage.
r. Cricoid cartilage.
s. Thyroid gland.
u. Thyro-cricoid muscle.
v. Cervical vertebræ.
x & *y*. Muscles of neck
z. Innominate artery

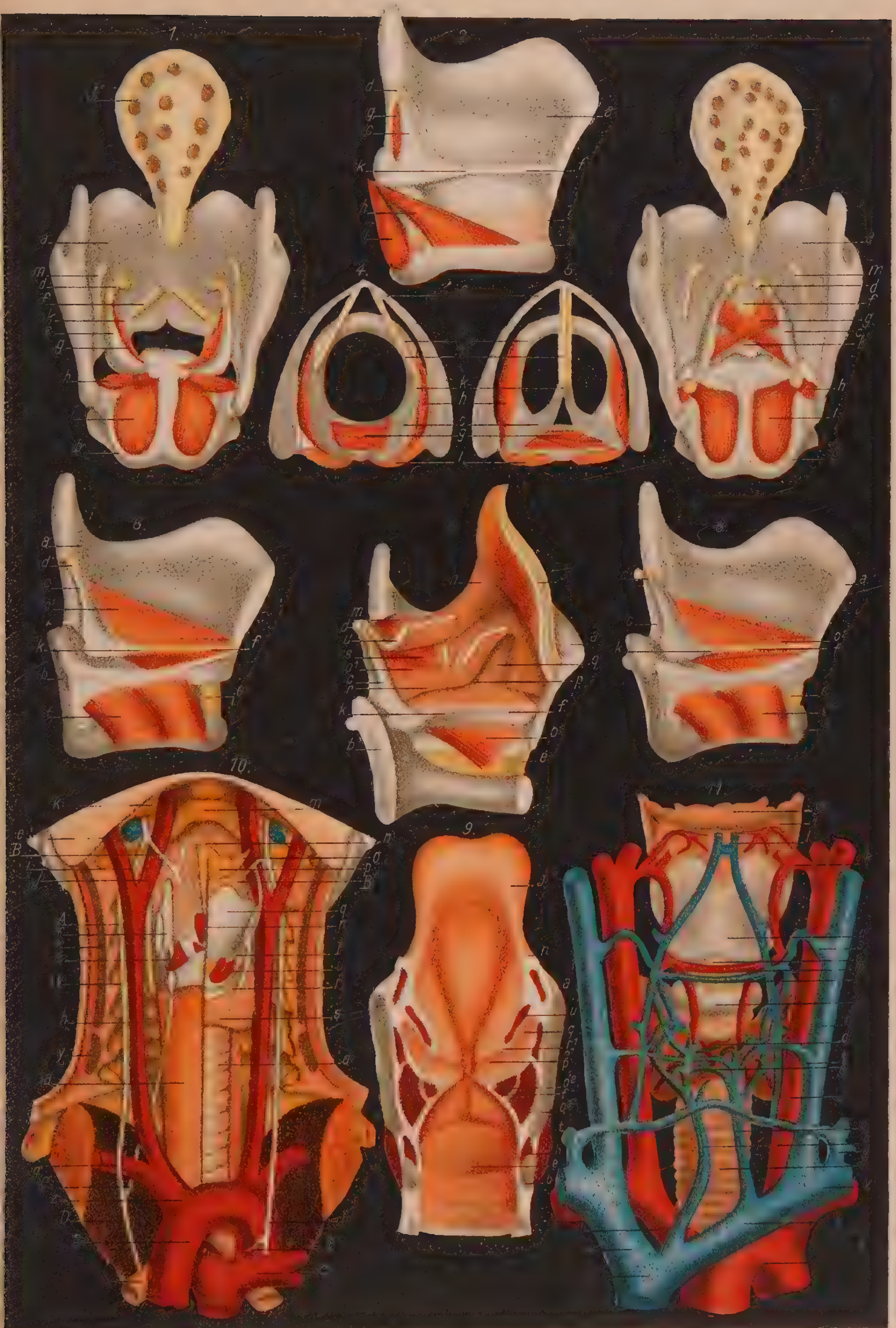
FIG. 11.

ARTERIES AND VEINS OF THE ANTERIOR PORTION OF THE NECK.

Vessels of the neck, showing those in danger of being severed in making artificial opening into the larynx and trachea, and their connections.

a. Trachea.
b. Cricoid cartilage.
c. Thyroid cartilage.
d. Thyroid gland.
e. Crico-thyroid membrane.
f. Thyro-hyoid membrane.
g. Hyoid bone.
h. Aorta.
i. Innominate artery.
j. Common carotid artery.
k. Superior thyroid artery.
l. Anterior jugular vein.
m. Crico-thyroid artery.
n. Internal jugular vein.
o. Thyroid plexus.
p. Right inferior jugular vein.
q. Left inferior jugular vein.
r. Crico-thyroid vein.
s Superior thyroid vein.
t. Middle thyroid vein.
u. External jugular vein.
v. Subclavian vein.
x. Right and left innominate vein,
y. Superior vena cava.

Plate VII.



C. E. Sajous, Pinxit.

Burk & M^c Fetridge, Lith. Phila.

clarionet is caused to vibrate by the breath of the player. The pitch of the note produced depends upon the tension of the vocal bands, which in turn depends upon the degree of displacement backward of the arytenoid cartilages, induced by the action of the thyro-cricoid muscles upon the cricoid cartilage. If now another note is to be sounded, say one tone higher, the thyro-cricoid muscles contract a little more, increasing the tension of the bands in proportion. If, on the contrary, a lower note is to be given, the thyro-arytenoid muscles contract and approximate the vocal processes of the arytenoid cartilages to the thyroid cartilage, while the thyro-cricoid muscles relax to an equal degree. Although their tension is decreased, the vocal bands are thus held steadily between the two antagonistic sets of muscles, and a note can be prolonged without change of pitch as long as the expiratory breath lasts.

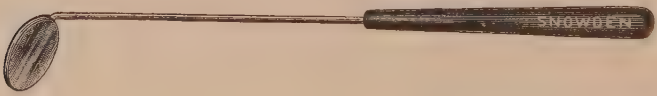
For the clear production of the voice, absolute integrity of the vocal bands and muscles must exist. A slight congestion of the mucous membrane of the former, by thickening their edges, interferes with their proper vibration, and hoarseness is produced, while great congestion may cause complete loss of the voice, by rendering vibration impossible; again, their approximation and vibration may be prevented by the presence of a tumor or paralysis of some of the adductor muscles. Inflammation of the muscles may also compromise greatly the production of voice through the paresis induced by the inflammatory infiltration.

CHAPTER XXII.

LARYNGOSCOPY.

Laryngoscopy is the term applied to the optical examination of the larynx. This is accomplished with the assistance of the laryngeal mirror, sometimes called "laryngoscope," and either natural or artificial light. The laryngeal mirror employed in this country consists of a plain, round mirror, varying in diameter from one-half to one inch, and mounted in a metallic frame. To the edge of this frame, a strong wire stem, about four inches in length is attached, at an angle of about 120°; this, in turn, is either securely connected with a small handle, or left free so as to be introduced at will into a universal handle, an ordinary handle perforated longitudinally, and furnished near its extremity with a thumb-screw, which can be tightened down upon the stem when this is introduced. Different sizes of laryngeal mirrors are furnished, and are numbered according to their size, No. 1 representing the largest size mirror, one inch in diameter; No. 2, the second in size, being three quarters of an inch in diameter, and No. 3, which is only one-half inch in width. When possible, the largest mirror should be used, its surface reflecting a greater number of luminous rays, and, therefore, illuminating the parts more

Fig. 76.

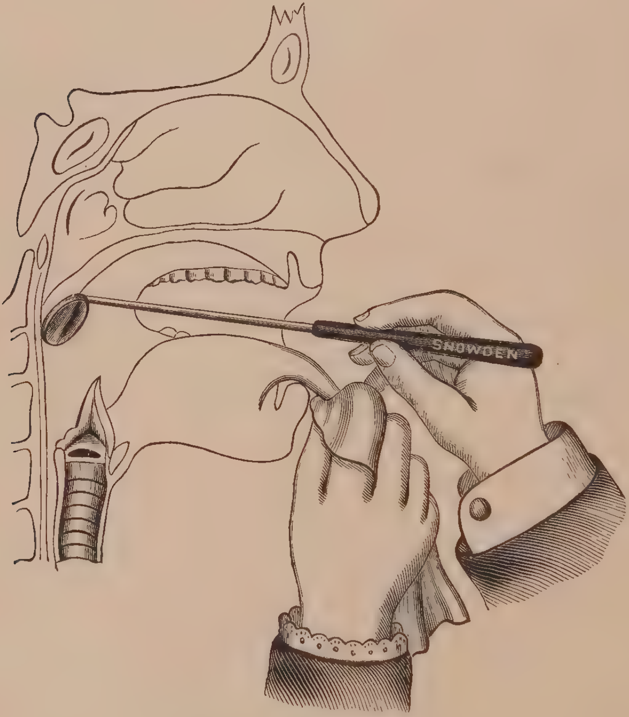


Laryngeal mirror.

brightly. In some cases, however, the smaller mirrors can alone be used, their limited diameter enabling them to be introduced without touching the surrounding parts. In children, for instance, a mirror larger than No. 2 can but very seldom be used, the narrowness of the pharyngeal cavity otherwise causing the walls to come in contact with the circumference of the frame.

We have seen in the chapter on anatomy, that in order to completely uncover the laryngeal cavity, it is necessary to raise the epiglottis from its semi-recumbent position, and that the glosso-epiglottic ligament unites it to the tongue. Protrusion of the latter, therefore, causes elevation of the epiglottis, the parts behind and below it thus becoming visible. For a laryngeal examination, this is indispensable. The tongue must not only be protruded, but it must be held so, either by the patient or the physician. When the patient is first seen, he is frequently inclined to withdraw the head when the mirror is being introduced, but as soon as it has been applied once or twice, the slight degree of apprehension leaves him, and he holds his head steadily. In the first examinations, therefore, it is preferable to hold his tongue for him, a clean towel being interposed between fingers and tongue. Later on, he is shown how to grasp the organ between his index finger and thumb to *hold* it, not to pull it, lest the frænum be wounded by the lower incisors. He should use his right hand if the mirror is held in the right hand by the observer, or *vice versa*, the object being to avoid the impediment which the patient's hand would offer were they both on the same side of the mouth. The tongue being withdrawn, the next step is to adjust the light so that the central rays will impinge upon the spot just above the level of the surface of the tongue. The laryngeal mirror, held like a penholder, is then exposed over the light a couple of seconds, with the *glass* surface downward. This is to heat it slightly, so as to avoid the condensation of the watery portion of the breath which would take place upon it, if it were cold, thus blurring it completely. Its posterior surface is then placed upon the back of the other hand so as to ascertain that it is not sufficiently hot to burn the patient, after which the mirror is quickly introduced into the mouth, the long axis of the instrument being first perpendicular, then brought to the horizontal by raising the handle as the instrument is advanced in the oral cavity. In this manner the surface of the mirror is in relation with the surface of the hard palate

Fig. 77.



The laryngeal mirror in position.

until in position, thus greatly diminishing the likelihood of touching the base of the tongue, and avoiding gagging and nausea. As soon as the uvula is reached, the back of the mirror is placed against it, and it is pushed upward and backward, adjusting at the same time the surface of the glass (by depressing the handle slightly) so as to cause the image of the laryngeal cavity to appear in it. If no obstruction is presented, an unruly or over-sensitive tongue, a depressed epiglottis, etc., the upper border and interior of the larynx and the upper portion of the interior of the trachea will be seen, and if the patient be breathing quietly, the edge of the vocal bands will appear in the abducted position, looking like little white shelves, about three-quarters of an inch long, which are approximated at one end and diverge from above downward (in the mirror) forming a V upside down. If now the patient is requested to say *ah*, *ah*, the vocal bands will be seen to rotate suddenly upon their anterior attachment and come together, the Λ being replaced by two parallel bands with a slight slit between them. Their width will appear greater than when they were separated, the greater part of their surface being then hidden under the ventricular bands, their edges merely appearing.

As represented in the mirror, the image appears to the observer as if he were standing behind the larynx and looking into it, this being in reality the position of the mirror, which also stands behind and above the larynx. The observer sees it, therefore, as if he were in the mirror's place. The anterior commissure or the apex of the Λ formed by the abducted vocal bands being anterior in relation to the throat, it is therefore seen in the upper portion of the mirror, while the widest portion of the Λ is near its lower margin.

Beginning at the upper portion of the image, the first object seen is the *epiglottis*, its curled border varying greatly in shape with different individuals, but generally presenting the shape of a Cupid's bow, with the concavity downward. Its color is yellowish pink, with arborescent blood-vessels strewn over its surface. Starting from each side and curving inwardly as they advance, are the *ary-epiglottic folds*, which form the upper border of the laryngeal aperture, and are united posteriorly by the *inter-arytenoid fold*, formed by the arytenoideus muscle and its overlying membrane. At the point of junction of the inter-arytenoid fold with the ary-epiglottic fold on each side, may be seen a little knob, formed by the diminutive *cartilage of Santorini*, which surmounts the apex of the arytenoid cartilage. A little higher up towards the epiglottis, another but somewhat larger knob may be seen on each side, this being the eminence caused by the *cartilage of Wrisberg*, a perpendicular strip of cartilage, which seems to support the walls of the larynx. The four knobs are enclosed in the ary-epiglottic folds, which are rather more pink in color than the epiglottis, and devoid of arborescent vessels.

Going deeper into the laryngeal cavity, we now come to the *ventricular bands*, whose posterior insertions about correspond with the interval between the cartilages of Wrisberg and Santorini. Their anterior commissure is hidden by a more or less prominent nodule, the *cushion of the epiglottis*, which projects from the internal surface of the latter, and serves, when it is depressed, to close what interval may be left between them. The ventricular bands generally present about the same color as the ary-epiglottic folds, which surround them.

Below the ventricular bands and parallel with them, appear the *vocal bands*, contrasting by their bright white color, with the pink hue of the surrounding parts. Their anterior commissure is also generally hidden by the cushion of the epiglottis, while the posterior extremities are attached immediately below the cartilages of Santorini. If the mirror is slightly rotated on its axis and turned somewhat, a dark recess will be seen between the ventricular band and the vocal band of the side examined; this is the aperature of the *ventricle* of the larynx. Below the vocal bands, the tracheal rings are brought to view, five or six being generally seen, while in some cases the entire trachea and a small portion of the right bronchus may be examined.

OBSTACLES TO LARYNGOSCOPY.

In many cases, a laryngoscopic examination is accompanied by great difficulty. A peculiar conformation of the epiglottis, enlarged tonsils, an over-sensitive throat, etc., are obstacles which often have to be overcome before a satisfactory examination can be conducted. An overhanging epiglottis is the most frequent cause of interference; the depression may be slight, and cover but a small part of the anterior portion of the laryngeal cavity, or it may be so great as to allow only its posterior border to appear. In these cases a satisfactory examination can only be obtained by raising the epiglottis while the mirror is in position. Several instruments have been invented for the purpose, but they can very seldom be used without causing the patient to retch and gag.

The application of a four per cent. solution of cocaine to the posterior surface of the epiglottis, however, renders its manipulation possible, and any curved probe, or the instrument shown in Fig. 69, turned downward, may be employed to raise it against the base of the tongue. The probe is, of course, held with the left hand if the mirror is held with the right. Two or three successive applications of cocaine, at a couple of minutes' interval, are sometimes necessary to render the epiglottis completely asensitive.

An over-sensitive pharynx is probably the obstacle most frequently met with. The mirror is hardly in the mouth but that the patient begins to manifest all the symptoms of a coming emesis, a result which occasionally takes place. A spray of cocaine, however, is very effective in mastering superficial sensitiveness. If an atomizer be not at hand, it can be applied with the brush or cotton pledget, the brunt of the application being made over the base of the tongue. After two or three examinations with cocaine, the parts become much more tolerant and the laryngoscope can generally be borne without trouble. When cocaine cannot be had, gargling with ice-water, a thirty-grain dose of bromide of potassium, morphia, etc., will sometimes succeed in allaying the irritability for a short while. In some cases it is utterly impossible to examine the throat without the assistance of cocaine. When this agent cannot be had, training the parts to the presence of a foreign body by the introduction, two or three times a day for a week or so, of the handle of a spoon or some other blunt object, will generally succeed in diminishing their sensibility sufficiently to render an examination possible.

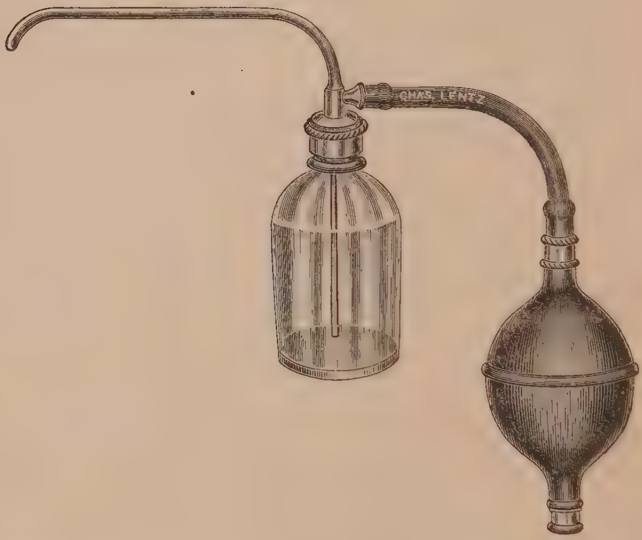
An elongated uvula sometimes interferes with the examination, by bending anteriorly, then upward, around the lower margin of the mirror, through the pressure exerted by the latter upon it and the underlying pharyngeal wall. This can be overcome, in most cases, by quickly passing the mirror below the tip of the uvula, then raising the latter upon its metallic or posterior surface until the proper position for the instrument is reached. Enlarged tonsils sometimes prevent the introduction of the mirror in the pharyngeal space, rendering the use of a smaller mirror necessary. An unruly tongue occasionally renders a view of the mirror, when this is in position, almost impossible. It should in that case be held by the observer, a tongue-depressor being used in connection with the towel employed. The handle of the instrument can be held between the thumb and the tongue, while the index finger under the latter serves as the supporting point. Care should be taken not to exert pressure on the portion of the tongue lying on the lower teeth, lest the frænum be cut or crushed.

CHAPTER XXIII.

INSTRUMENTS USED IN CLEANSING AND MEDICATING THE LARYNX.

When cleansing of the laryngeal surfaces is indicated, this being by no means as frequently the case as in diseases of the nose or pharynx, Sass' laryngeal tube (Fig. 17) may be employed. It is useful to remove masses of purulent secretion which adhere tenaciously to the mucous membrane. For general purposes, however, an atomizer, such as that shown in Fig. 19, with a tip turned downward, or the instrument represented in the annexed cut, which, notwithstanding its single bulb, produces a continuous flow, is preferable, the spray being much lighter and presenting no mechanical force to irritate the parts.

Fig. 78.



Lentz's atomizer.

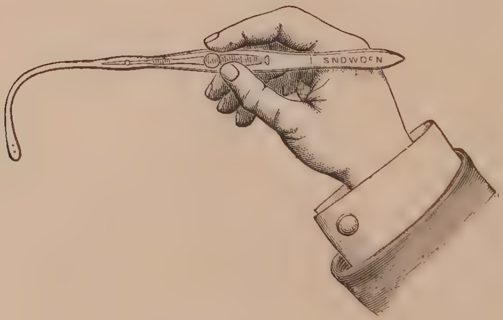
When an atomizer is to be used, the tongue should be withdrawn and held by the patient, so as to raise the epiglottis and uncover the larynx as much as possible. The bottle is held with one hand, while the other is used to work the bulb, unless an air-compressor be employed, when the tongue can be held by the physician, so as to maintain the head in a steady position. The tube being introduced into the mouth, the patient is directed to take long breaths and to make his respiration as soft as he can; this is to diminish as much as possible the resistance which the respiratory current presents to the spray, thus preventing its access to the larynx during expiration. During inspiration, the penetration of the spray into the trachea being reduced to a minimum, the liability to cough is decreased. When it is desirable to reach as much of the vocal bands as practicable, the patient is requested to make a sound, which will cause the bands to come together, exposing their entire surface. A couple of minutes, at the longest, are sufficient, in most cases, to thoroughly cleanse the laryngeal surfaces, or at least to so soften the mucoid or muco-purulent masses as to cause them to be easily expectorated.

Impediments are often encountered which render the use or the atomizer very difficult. A thick, rebellious tongue, an over-sensitive throat, retching, caused by the least approximation of the point of the tube to the papillæ at the base of the protruded tongue, and an overhanging epiglottis, are some of the difficulties met with. To subdue a rebellious tongue, the tongue depressor may be used to advantage, the organ (held by the patient) being forced down in the centre. Over-sensitiveness of the throat and the base of the tongue can be much reduced by swabbing the parts with a four per cent. solution of cocaine, the anæsthesia lasting sufficiently long to enable the operator to treat the parts effectively.

For the application of solutions in small quantities, I prefer the cotton pledget to either the sponge or the brush; it is cleanly and soft, and can be thrown away after each application. The only feature which somewhat militates against its use, is the liability of small films to become detached and to cause irritation in the larynx by remaining there. This can be obviated, however, by passing the cotton pledget over the light used for illumination, which will cause what films are not closely adherent to the pledget proper to burn off.

I have found the instrument shown in Fig. 22 (which is shown in Fig. 79 in the position it occupies when held in the larynx) most convenient. Any size of cotton pledget, folded as described on page 45, may be used with it, so that a large as well as a small surface can be thoroughly treated.

Fig. 79



Laryngeal cotton forceps in position.

The manipulation of this instrument in the larynx is much the same as for the posterior nares. The laryngoscopic mirror, held with the left hand, should be used to guide the applications; the forceps being introduced with its curved surface lying horizontally, is quickly turned on its axis, the tip being over the laryngeal cavity. The point to be touched is then well noted in the mirror, and the tip is suddenly lowered and applied to the desired spot, the forceps being then quickly, but gently, withdrawn. This manipulation presents some difficulty at first, but this is overcome after repeated trials. When the application is to be made to a larger area, or to the entire surface of the larynx, a large piece of cotton is used, and when the pledget is introduced into the laryngeal cavity, it is left there an instant, when muscular contraction will squeeze and deplete it of its solution. Cotton pledgets should at no time be full of the fluid used, lest the latter run down in a stream along the internal wall of the trachea and produce considerable distress and coughing.

For the application of powders, the scoop insufflator, shown in Fig. 25, with the tip turned downward, is the most convenient instrument when a fixed quantity is to be employed. The manipulation is the same as for the atomizer, the tongue being held out by the patient, so as to raise the epiglottis, and the mirror being used to guide the application. When the powder is to be applied to or above the vocal bands, the patient is requested to make a sound, and the powder being blown out just as he does so, the agent used covers the supra-glottic surfaces without falling into the trachea, while the vocal bands are thoroughly covered. When the powder is to be distributed evenly over the entire surface, this can be done by dividing the single insufflation into a series of small puffs, changing the direction of the tip of the insufflator each time, and holding it as high as possible over the larynx. The mucous membrane is thus covered with a thin film of the remedy. When a spot of ulceration is to be treated and the powder is to be limited to it, the tip of the insufflator should be approached as closely as possible over it, and a slight puff will cover it thoroughly.

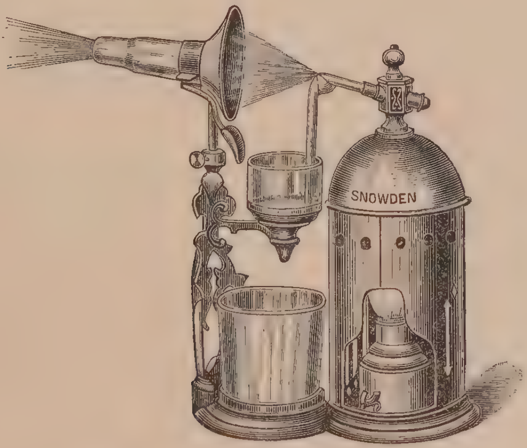
For the insufflation of remedies not requiring exact dosage, such as iodoform, Dr. A. H. Smith's insufflator (Fig. 26) is by far the most convenient, the tip being turned downward. The two hands being necessary for its manipulation, the mirror cannot be used; but as the remedies employed in that manner are diffused over the entire laryngeal surface, the assistance of that instrument is not required.

Steam inhalations are of advantage in the treatment of laryngeal affections when the patient can remain at home. If, on the contrary, he is obliged to go in the open air, they are more hurtful than beneficial, offering positive danger sometimes, and especially in cases of subacute laryngitis. The sudden transition to which the inflamed parts are subjected, by the exposure to widely different degrees of temperature, readily explain the manner in which an acute inflammation can be brought about.

A popular method of administering steam inhalations is to half fill a pitcher with warm water, using it pure or medicated with some diffusible agent, and to surmount the vessel with a towel folded cone-shape, with the apex of the cone turned upward. The patient having introduced his mouth and nose in the opening formed above, inhales deeply as long as an appreciable amount of steam is generated. The inhaler described on page 50, and shown in Fig. 28, presents many advantages for the administration of pure or medicated steam. One-half pint of water being poured into the can, this is placed on the stove or on an alcohol lamp until the water is heated to the desired temperature, this being noted on the thermometer which protrudes through the stopper. If a medicinal agent is used, it is dropped in through the mouth of the instrument, the rubber stopper being then adjusted so as to close the aperture hermetically. The patient should then introduce the mouthpiece, which is covered with rubber tubing to prevent burning of the lips, into his mouth and breathe through it, the inspiratory current being drawn from the instrument through the lower valve, while the expired column of air is driven out into the surrounding atmosphere through the upper valve. This can be continued for two or three minutes, or more, if the patient is not fatigued. For office practice, pieces of rubber tubing, an inch long, can be kept on hand so as to supply a new mouthpiece covering for each patient. This is not only a measure of cleanliness, but also of prudence.

Another instrument used for administering steam inhalations, is the steam atomizer shown in Fig. 80. The steam is formed in a little boiler supported over an alcohol lamp, and while passing out through a horizontal glass tube, over the end of another but perpendicular tube which dips in the medicament used, it produces a vacuum in the latter which causes the medicinal agent to ascend and to mix with the steam current. It is a very convenient instrument, but is rather difficult to keep in perfect order. It is employed in the same manner as the preceding.

Fig. 80.



Codman & Shurtleff's modification of Siegle's steam atomizer.

CHAPTER XXIV.

THERAPEUTICS OF THE LARYNX.

CLEANSING of the laryngeal mucous membrane is of great importance before the application of local remedies, in chronic catarrhal affections. In acute affections, it but stimulates the inflammatory process and should therefore be avoided. In chronic laryngitis, as well as in the laryngeal manifestations of tuberculosis and syphilitic laryngitis, it forms a prominent part of the treatment, not only relieving the surfaces of the secretions which prevent the contact of the remedy used, but also exerting a marked influence in limiting the ulcerative process.

In the treatment of laryngeal affections, a greater amount of circumspection is necessary in choosing cleansing instruments than for the nasal cavities and pharynx. If the presence of chronic disease, accompanied by copious discharge, renders their use necessary, not only to wash away the discharges, but also to expose the mucous surfaces to the action of the more active agents used in the treatment, Sass' laryngeal tube produces the strongest spray, and is therefore to be theoretically preferred; but the mechanical power which serves so well for the removal of secretions is frequently more than the inflamed surfaces can bear. The comparatively large atoms of fluid act somewhat like foreign bodies, and latent inflammation may be turned into active inflammation, and the application, therefore, do more harm than good. Lennox Browne, of London, considers the use of the spray in the larynx as unphysiological and foreign to the natural function of the organ. I am not prepared to advocate this opinion in its entirety, for I believe that with proper choice of instruments as regards the density of the spray produced, and a careful determination of the degree and kind of inflammation present, the atomizer is a valuable instrument. In other words, I consider it as being of great assistance in the treatment of laryngeal affections, if used intelligently.

When a strong spray such as Sass' is not well borne by the patient, or the membrane betokens, by its diffuse redness, a subacute inflammation in addition to the chronic state, atomizers, such as those shown in Figures 19 and 78, may be tried, their spray being much lighter and presenting no appreciable mechanical force. I have always been able to use either of these instruments, even when a considerable degree of subacute congestion existed.

As to the selection of the kind of cleansing solution to be used, the remarks made on the subject when speaking of the nasal cavities, can be here repeated. When there is profuse discharge, dependent simply upon a relaxation of the membrane, its mere admixture with an alkaline liquid will be sufficient to wash it off. If the secretion is thick, however, a solvent will facilitate its separation from the seat of production. Bicarbonate of sodium and biborate of sodium (gr. iv–℥j) or the solutions on pages 75 and 118 may be used, according to indications.

MEDICATION.

Taking the solutions usually recommended for the treatment of nasal affections as a basis, laryngeal solutions should be at least twenty-five per cent. weaker, lest irritation be produced. The proportions recommended for the nose, in this work, however, are weaker than those generally employed, and astringents, stimulants, alteratives, and sedatives can be used in the proportions given in the chapter on therapeutics of the nasal cavities, the drugs being also the same.

In the choice of agents to act as diluents with more potent drugs in the form of powder, preference should be given to substances capable of being easily dissolved in the laryngeal mucus. Bismuth, which is frequently recommended, does not possess this property, and remains a long while on the spot to which it was applied, acting in a certain manner like a foreign body, producing cough and retching, and, consequently, irritation. Pulverized acacia is probably the most satisfactory agent we possess for the purpose; it is bland and soothing, and covers the membrane with a uniform coat which separates it from the air current for awhile, during which the active principle of the powder is absorbed. Escharotics are also used in the larynx, chromic acid being manipulated with the greatest ease and at the same time being very effective.

CHAPTER XXV.

DISEASES OF THE LARYNX.

SUBACUTE LARYNGITIS

(Synonyms :—Simple Catarrhal Laryngitis ; Catarrhal Laryngitis ; Erythematous Laryngitis.)

Etiology.—Exposure to cold is the most frequent cause of subacute laryngitis: a sudden change from heat to cold, such as going from a warm room into the open air insufficiently clothed, exposure to draughts, wet feet, etc. It is for that reason very common during fall, the system being relaxed by the preceding warm weather and therefore more prone to become influenced. Local irritation by irritating vapors, tobacco smoke, dust, etc., are also frequent causes. It is sometimes due to over-exertion of the voice, in loud singing, for instance, when the singer has had no training in the proper use of his vocal organ. It is often present in army officers, after manœuvre or drilling. Subacute laryngitis is a frequent complication of acute rhinitis and occasionally of acute bronchitis. Persons leading sedentary lives are more subject to it than those accustomed to out-door exercise. Rheumatic and scrofulous individuals seem to be more predisposed to it than others. It may also occur as a symptom of scarlatina, measles, and the exanthemata.

Pathology.—In subacute laryngitis the inflammatory process is confined to the superficial layers of the mucous membrane, and does not at first involve the submucous tissue and sometimes the muscles, as in acute laryngitis. After it has lasted for some time, however, it may penetrate these parts, the inflammatory infiltration spreading to them.

Symptoms.—The first symptom usually experienced, is a pricking sensation, as if a pin were sticking in the throat. Slight chilliness may occur, but in the majority of cases it does not. Hacking is indulged in to relieve the larynx of a supposed foreign element which cannot be dislodged. The voice soon becomes hoarse, and a slight burning pain is experienced, which extends sometimes along the pharynx. Slight dyspnœa is present in most cases, and is sometimes the most annoying feature of the trouble. As the case advances, the hoarseness becomes greater and greater until the voice is sometimes entirely lost, the patient being obliged to speak in a whisper. Deglutition is at times quite painful. There is usually a coarse, barking cough, which is, after a few days, accompanied by expectoration. This expectoration, at first gluey and viscid, soon assumes a muco-purulent character, and becomes sufficiently purulent in some cases to cause apprehension in the belief that the lungs are seriously involved, thoracic pains, caused by the muscular exertion in coughing, serving to increase the fears of the patient.

Examined with the laryngeal mirror, the entire larynx appears congested, the ventricular bands and inter-arytenoid commissure appearing especially red. The vocal bands are more or less congested also, and small vessels are distinctly seen coursing over them. The epiglottis usually takes part in the general inflammation, arborescent vessels and diffuse redness covering its anterior and posterior surfaces.

Prognosis.—The prognosis of subacute laryngitis is generally favorable, but it may be suddenly developed into the acute affection and assume formidable proportions. Its duration is from a few days to a couple of weeks. Frequently repeated, subacute laryngitis may conduce to chronic laryngitis.

Treatment.—The most important requisite in the treatment of this affection is absolute rest. The use of the voice, however slight it may be, naturally increases the local congestion, aggravating the symptoms. The patient should remain at home, and avoid atmospheric transitions such as going from one room to another of a different temperature, sitting by an open window, etc. Frequently, an attack of subacute laryngitis can be suddenly cut short by a derivative purgative, castor oil being the most effective; although a "popular" remedy, its effects are some time so gratifying that it should not be considered as obsolete. Aconite in drop doses every hour, to control the fever and diminish the local congestion, when administered early, also succeeds at times in checking the affection. When the malady has existed for some time, wine of coca, a wineglassful every three hours, generally succeeds in bringing about a favorable change in from thirty-six to forty-eight hours. In the subacute laryngitis of actors or other persons who have to use their voice extensively, it is especially beneficial, by depleting the congested parts of superabundant blood, and diminishing the sensitiveness to the contact of the air currents. A fine spray of a two per cent. solution of cocaine applied alone, also has a beneficial influence, but this becomes much more marked with wine of coca internally. Pulverized cubebs, ten grains every three hours, is a favorite remedy. Camphor packed into a little glass tube and inhaled, is occasionally sufficient to arrest an attack in the earliest stages.

I have not found local applications with brush or cotton pledget, of astringents, detergents, etc., of value in these cases, and cannot therefore recommend them. The mechanical irritation, even when powders are used, does, in my opinion, more harm than good, and since I have abandoned them and resorted to general treatment, I have had better results. Morphia is a remedy of apparent value in these cases, but I have not found it so, the drug probably increasing, by checking to a degree the intestinal action, the laryngeal congestion.

ACUTE LARYNGITIS.

(Synonyms:—Acute Catarrhal Laryngitis; Acute Catarrh of the Larynx.)

Etiology.—Acute inflammation of the larynx is but rarely met with. It may occur traumatically or idiopathically, traumatic acute laryngitis being the commoner of the two. The accidental inhalation of hot water (a frequent occurrence in children), flame, caustic vapors, etc., the presence or violent extraction of a foreign body, the deglutition of caustic acids, accidental or with suicidal intent, and wounds penetrating the laryngeal cavity, are the most frequent causes of the traumatic variety, while the idiopathic may be due to exposure to cold, and occur as a sudden complication of an acute attack; it may find its initial cause in a chronic catarrhal inflammation, such as that occurring in syphilis, presenting itself in that case as a sudden exacerbation of the trouble.

Pathology.—Acute laryngitis differs from the subacute variety, in that the inflammatory process, instead of being superficial, extends to the submucous tissue and to the muscles. In traumatic laryngitis, inflammatory infiltration takes place suddenly in the majority of cases, and the dyspnœa is caused by the mechanical impediment to respiration. The pathological process of idiopathic laryngitis also culminates in submucous infiltration in most cases, but it is likely that paralysis of the motor muscles and spasm, are elements of importance in the production of the most marked symptom, dyspnœa.

Symptoms.—Traumatic laryngitis, due to the inhalation of steam, fire or caustic vapors, or the deglutition of hot water, usually sets in at once, the infiltration of the submucous areolar tissue causing marked swelling of the ary-epiglottic folds and ventricular bands. Dyspnœa soon becomes of such intensity that the other symptoms, those of subacute laryngitis, are overlooked; and if the patient is not soon relieved by one of the means indicated under the head of treatment, death by asphyxia is likely to occur. Acute inflammation, as a result of the presence of a foreign body, is generally developed suddenly, some time after the object has been in the larynx, the acute symptoms occurring as a result of the ulcerative process due to pressure; when the foreign body is sharp, however, the acute symptoms may present themselves early, as a result of the solution of continuity of tissue. In this manner, the violent extraction of a foreign body and wounds penetrating the laryngeal cavity, may also cause acute laryngitis.

Idiopathic acute laryngitis, occurring as a sudden complication of subacute laryngitis, is at times so rapidly fatal that no warning of the oncoming issue is given. The patient retiring with a laryngeal inflammation just sufficient to give rise to slight hoarseness, for instance, may be found dead in the morning. These cases are fortunately very rare, and are more likely due to spasmodic contraction of the vocal bands than to submucous infiltration. As a complication of syphilitic ulceration, infiltration sets in much less rapidly, the symptoms gradually increasing in intensity.

The early objective symptoms vary with the causes; in carbolic acid poisoning, for instance, the parts may at first appear white, etc. Soon, however, the inflammatory process assumes the general form, and the intense redness of the entire larynx is discerned in the laryngoscope. If the caustic substance has only come in contact with its upper border, the epiglottis and the ary-epiglottic fold may present the greatest degree of congestion, while the ventricular bands and the vocal bands appear comparatively free. As the case progresses, the swelling increases, until the vocal bands hardly appear beyond the edge of the ventricular bands. The surrounding parts are almost always inflamed also, especially in traumatic laryngitis.

Prognosis.—Acute laryngitis, complicated with œdema, is usually fatal if left to itself, the traumatic variety, unless very slight, presenting the greatest danger. Occasionally, the inflammation recedes after having reached a certain height, but the possibility of this occurrence should not influence the treatment.

Treatment.—The necessity of acting promptly is self-evident. The danger being due to infiltration, and thus causing swelling and obstruction to respiration, the first step is to ascertain, by means of the laryngoscope, the degree of infiltration. The respiration should not be taken as a criterion, as the œdema may be quite severe in the upper part of the larynx at first, without presenting much obstruction to the passage of air, and suddenly kill the patient by obstructing the laryngeal aperture unexpectedly. If the degree of infiltration is limited, and not making rapid headway, a general derivative treatment or depletory measures may be of service. A hot mustard foot-bath, followed by free diaphoresis, avoiding at the same time all drinks, may prove very beneficial by drawing the blood to the periphery and diminishing the local pressure. Tincture of belladonna, five drops every hour until its physiological effect becomes marked, by contracting the laryngeal blood-vessels is also valuable, in counteracting the infiltration. Local applications in the form of powders or solutions, with brush or cotton pledget, should be strictly avoided, their mechanical irritation doing more harm than the agent applied does good. Steam may be inhaled with benefit, and the atmosphere of the room of the patient should be rendered moist by either boiling water or slacking lime in it. The steam atomizer shown in Fig. 79 may be used with advantage for the inhalations. Although I have had no opportunity of treating a case since the discovery of cocaine, it seems to me that a twenty per cent. solution of this drug, applied with a fine spray atomizer, would produce a marked effect in depleting the infiltrated parts. Sprays of alum or sulphate of zinc (two to five grains to the ounce), are recommended by Cohen. Leeches may be used advantageously, five or six being applied externally some distance from the thyroid prominence.

When the œdema is marked, or when the dyspnœa is evident and on the increase, surgical measures should be resorted to. The swelling must be scarified and relieved of some of its contents. With the assistance of the laryngeal mirror the procedure is very easy. The ordinary pocket-case curved bistoury may serve efficiently for the purpose, its blade, as far as to within a line of the point, being surrounded by string, to prevent cutting of the parts anterior to the larynx. The tongue being drawn out, the epiglottis will generally be seen standing erect and swollen. This, however, had better not be punctured, lest the patient object to further cutting. The mirror being introduced, the knife is passed around the side of the epiglottis and its point is caused to penetrate the external border of the ary-epiglottic fold, thus causing the blood and serum to flow into the pyriform sinus, instead of the laryngeal cavity. If possible, the other side had better be treated in the same way. Laryngeal lancets, especially adapted for œdema, are generally recommended, but being very seldom used, they are usually not at hand when wanted, and it is best not to depend on them. One scarification is usually sufficient to deplete the parts effectually, the relief being immediate. A second is seldom required. In some cases the symptoms are so urgent that even this procedure is not sufficiently rapid to save the case, and tracheotomy has to be performed.

Traumatic laryngitis is sometimes followed by one or more abscesses near the seat of injury, in which the cartilages may become implicated. The pus should be evacuated by free scarification.

Convalescence after an attack of acute laryngitis is generally quite slow. The voice remains hoarse for a time and becomes easily fatigued. It is frequently followed by chronic laryngitis, which predisposes the patient to renewed attacks of the acute variety.

ŒDEMA OF THE LARYNX.

(Synonyms:—Œdema Glottidis; Œdematous Laryngitis.)

Etiology.—Besides occurring as a complication of acute laryngitis, œdema of the larynx may present itself without previous local inflammatory manifestations. The larynx may become the seat of dropsical effusion in diseases characterized in their advanced stages by dropsy, such as Bright's disease, cirrhosis of the liver, cardiac affections and phthisis; or suddenly, by exposure to cold when the system is in a weakened condition. Œdema may also be caused by the administration of the preparations of iodine, especially when the affection for which such a preparation is given is located in the throat. I have seen two such cases, in one of which the use of iodide of potassium had to be stopped definitively, after three trials, each causing marked dyspnœa, which ceased as soon as the administration of the drug was discontinued.

Œdema of the larynx may become chronic, occurring in that case as a concomitant symptom of syphilitic or tuberculous laryngitis and cancer. The acute form may assume chronicity, with a tendency to exacerbation.

Pathology.—The laxity with which the laryngeal mucous membrane is attached to the underlying tissues furnishes a ready explanation for the facility with which it becomes infiltrated and distended. In diseases in which obstruction to the blood current becomes an important element, the laryngeal submucous tissue offers but little resistance to the serous effusion which can here produce almost instantaneous distention, a result not produced in other parts, the limbs, hands, abdomen, etc.

Symptoms.—Occasionally, œdema of the larynx is so rapidly fatal that symptoms can hardly be said to have existed. When occurring in the course of dropsical affections, no other symptom may present itself other than dyspnœa. In most cases, however, local symptoms are evident: heat and pain, a sense of constriction around the throat, dryness, and impeded respiration, principally during inspiration. As the disease progresses, the symptoms become more marked, dyspnœa is more evident, the expiration as well as the inspiration being impeded. These symptoms may constitute an exacerbation which gradually declines, or the case may proceed from bad to worse until death takes place.

The appearance of the laryngeal membrane differs from that described under the last heading, only in color. Instead of being fiery red, resembling somewhat the surface of a ripe tomato, it is pale, at times almost yellow, watery, and translucent, appearing much like an œdematous prepuce.

Prognosis.—Œdema occurring as a secondary manifestation of another disease, is more likely to recur than that due to a local inflammatory process, unless the original cause can be eradicated.

Treatment.—Local applications, derivatives, and even depletory measures are of doubtful value in this variety of œdema. The distended folds of membrane must be scarified freely and the serum evacuated. The manipulation described under the last heading may be resorted to, or the finger may be introduced into the mouth and used as guide for any pointed instrument that may be at hand. The incisions must be free, and, as already said, should be made as much as possible on the edge of the ary-epiglottic folds, so as to cause the serous discharge to flow into the pharynx, instead of the larynx, thus avoiding asphyxiation by flowing liquid. After the incision, the fold shrinks suddenly; the relief is immediate, and in the majority of cases, lasting. If the dyspnœa is not relieved by the scarifications, subglottic œdema is likely to be present also, and tracheotomy is the only resource.

CHRONIC LARYNGITIS.

(Synonyms:—Chronic Catarrhal Laryngitis; Chronic Laryngeal Catarrh.)

Etiology.—Chronic inflammation of the vocal bands may result from repeated attacks of subacute laryngitis in connection with acute pharyngitis, but in the majority of cases it assumes the chronic form from the first, unpreceded by acute symptoms. As pointed out under the heading of hypertrophic rhinitis, it is a frequent complication of this affection, the chronic catarrhal inflammation extending by continuity of tissue to the larynx, which is itself made subject to all the exacerbations which the nasal disease undergoes.

A more frequent connection between the two diseases, however, is the irritation kept up by the post-nasal discharges, which either drop into the larynx, or trickle down along the posterior pharyngeal wall until the inter-arytenoid commissure is reached; here they accumulate to a degree, and maintain the posterior portion of the larynx in a constant state of irritation, which is further aggravated by the coughing and hacking induced. This cause of chronic laryngitis is insisted upon by Bosworth, and I can well confirm his opinion. A fact which I have frequently noticed in this connection, is that the amount of chronic laryngeal inflammation is in proportion to the degree of purulence of the discharges; purely mucoid secretions are tolerated by the laryngeal membrane without harm, but as soon as they become muco-purulent or purulent, local congestion is engendered, followed frequently by erosions. These cause hoarseness, cough, and expectoration (the sputa being formed principally by the nasal discharges), and the presence of phthisis is suspected. When hypertrophic rhinitis is present and sufficiently marked to prevent free respiration through the nose, oral breathing is another aggravating feature, the air reaching the larynx without being warmed, moistened or purified of its extraneous substances.

Gastric disturbances, especially those caused by debauchery, are frequent causes of chronic laryngitis, as evidenced by the hoarseness of drunkards. Hepatic torpidity is another cause, well known to singers, who find great difficulty in producing clear tones when "bilious." Excessive use of the voice, either in screaming or singing, when continued for a certain period, finally causes the temporary congestion, which exists at the time, to assume the chronic state. In hucksters, for instance, hoarseness is almost universal. In singers, a prolonged use of the voice, even frequently repeated, is tolerated without harm under certain conditions, *i.e.*, when the singer has received judicious training and uses his voice within its normal compass; but if he has not, his efforts to produce as high a note as possible and give his voice a volume which it does not possess, strain the muscles, and produce in them an inflammatory state which soon becomes chronic and extremely difficult to eradicate.

The continued inhalation of air containing much dust or other irritating substances, which accompanies many occupations, is another frequent cause; marble cutters, street sweepers, and colliers being probably the most affected.

Pathology.—The epithelial layer of the vocal bands is generally thickened and the superficial vascular supply increased. The hypertrophic process may involve the entire mucous membrane, but in the majority of cases, it is located in the posterior portion of the cavity, gradually extending to the other parts. The muscles are frequently the principal location of the inflammatory process, undergoing in some cases, hyperplastic induration. The principal cause of the hoarseness, however, lies in the thickened condition of the vocal bands, or rather of the membrane covering them; their vibration is devoid of the regularity and freedom necessary for the production of a pure tone, and the note is cracked or irregular. When the muscular tissues are involved, the pitch can only be altered with great difficulty, the extension and relaxation of the bands being interfered with according to the degree of inflammation. Implication of the arytenoideus is a frequent cause of aphonia, which sometimes occurs in the course of the affection.

Symptoms.—The symptoms of chronic laryngitis consist principally in an alteration of the purity of the voice. The hoarseness is not always continuous, however, but generally occurs after the voice has been used a short time. In some cases, the contrary is the case; the voice, at first, is quite hoarse, but after a few words or phrases, it becomes clearer and clearer, until it has returned to its normal condition. This does not last long, however; the voice soon becomes tired and resumes its hoarseness. Its pitch is usually lowered.

Cough, provoked by a tickling, itching sensation in the throat, is present in the majority of cases, and is accompanied by more or less expectoration, according to the cause of the trouble. There is seldom pain, a feeling of heat and constriction being more frequently complained of. Complete loss of voice is not a rare occurrence, but it generally returns after a few days' rest.

Left to itself, the disease, in some cases, becomes aggravated. General symptoms, such as fever, pyrexia, emaciation, gastric and intestinal disorders, supervene. Locally, the abrasions become active ulcerations, and a purulent, fetid expectoration, often streaked with blood, violent and harassing cough, pain extending to the ears, and dysphagia, render confusion of the disease with the local manifestations of tuberculous or syphilitic laryngitis quite possible. Chondritis or perichondritis may occur and bring on a fatal termination.

Viewed with the laryngoscope, the larynx presents a congested appearance, marked in proportion to the degree of active inflammation. The epiglottis is also congested, enlarged vessels coursing over its posterior surface. The outline of the prominences of Wrisberg and Santorini is somewhat obscured, and they present the same color as the surrounding parts. The general redness is not so great as in acute or even as in a marked case of subacute laryngitis, but the thickened appearance of the membrane and its irregular surface presents quite a marked contrast with the former. The vocal bands are more or less congested, according to the stage of the disease; they may present only a slight pinkish appearance or be as red as raw beef, cream-like, stringy mucus adhering to them, and forming films when they are separated. In phonation the bands appear relaxed; their edges, which are thickened, do not appear to come accurately together, and an elliptical opening is occasionally observed between them. This want of parallelism is due to paresis of the laxors of the vocal bands, through inflammatory infiltration.

Prognosis.—In the majority of cases of chronic laryngitis, when local ulceration and chondritis are not present, the prognosis is quite favorable. When the case is of long duration and the muscles have become markedly infiltrated by inflammatory products, which have to a certain degree become organized, hoarseness is likely to remain after all the other symptoms have disappeared.

Treatment.—The maintenance of local cleanliness is of the greatest importance in this affection, and superficial erosions and ulcerations will often disappear under the frequent application of a detergent spray of borax (gr. iv–℥j) to which a few drops of cologne have been added. In the fetid variety, permanganate of potash (gr. j–℥j) may be used, its stimulating properties tending to limit the ulcerative process. For office use, Sass' laryngeal spray tube is probably the best instrument, its dense spray offering slight and gentle mechanical force for the removal of the secretions. For the patient's use, the laryngeal atomizer, shown in Fig. 78, is a convenient instrument. Its spray is continuous and sufficiently large to bathe the parts thoroughly.

The frequency with which the parts should be cleansed depends entirely upon the amount of secretion; twice a day is usually sufficient, however, the patient being directed to inhale through the mouth while using the instrument. In order to render a cure possible, all general conditions or diseases bearing influence upon the etiology of chronic laryngitis, must be eradicated. All affections of the nose or pharynx should be appropriately treated. The bowels frequently need attention and I have seen cases much benefited by simple measures directed to them. Friedrichshall water is probably the best alkaline water at our disposal, its salines producing, besides the derivative action, beneficial local action. Gastric and hepatic disturbances should be met with appropriate remedies, while any underlying diathesis that may be present should also receive attention. Due care, as regards general hygienic measures, diet, etc., should also be exercised.

Local applications, after cleansing, are best made with the atomizer, the cotton pledget being only used to touch spots of ulceration with the stronger agents. For the general congestion I have not found strong solutions produce a beneficial effect, weaker ones giving rise to less irritation. Before resorting to these, however, the spots of ulceration should first receive attention. A sixty-grain solution of nitrate of silver, as advocated by Seiler, has been most serviceable in my hands, and a few applications generally suffice to cause their disappearance. Of late, I have partially anæsthetized the larynx with a ten per cent. solution of cocaine to make these applications, and have been able to locate them with greater accuracy. A small piece of cotton only should be used, which, having been adjusted to the end of the forceps and dipped in the solution, should be lightly squeezed between the folds of a towel to prevent dripping. With these precautions, no danger of spasm need be feared. A strong solution of sulphate of copper (gr. xxx–℥j) is also very efficient in those cases, but not so much so as nitrate of silver. Chloride of zinc (gr. x–℥j) is effective when the ulcerations give rise to much discharge, accompanied with fetor. Any of these applications should be made about twice a week.

For the treatment of the general surface of the larynx, I have noticed that a two per cent. solution of cocaine, used two or three minutes three times a day, produced great relief; after its application the membrane presents a paler appearance, the effect of the drug upon the blood-vessels being to contract them. Mild solutions of alum (gr. iij–℥j), applied in the same manner, are also beneficial. An excellent remedy in some cases is the O cosmoline, applied in the form of spray with the atomizer shown in Fig. 78. It covers the membrane with a thin film, which protects it effectually for a time. Applied immediately after the astringents, it seems to enhance their action.

CHAPTER XXVI.

DISEASES OF THE LARYNX.—*(Continued.)*

TUBERCULOUS LARYNGITIS.

(Synonyms:—Consumption of the Throat; Laryngeal Phthisis.)

Etiology.—The opinion still entertained by the majority of observers, is that tuberculous laryngitis is a secondary manifestation of tuberculosis of the lungs. That it may be primary is still a mooted question, owing to the impossibility of always ascertaining the presence or absence of lung disease when the laryngeal affection declares itself. The fact, however, that in a small number of cases reported the laryngeal affection had reached an advanced stage before the presence of the pulmonary trouble could be detected, seems to indicate a likelihood that tuberculous laryngitis can occur primarily. Males are more predisposed to it than females, owing probably to the greater degree of exposure to which the former are subjected, while age seems also to bear great influence as a predisposing cause, the fifteen years between the ages of twenty and thirty-five presenting a much greater proportion of cases than other periods of life.

Pathology.—The tubercular deposits or miliary tubercles in the membrane, are described as small spherical elevations, which appear in greater or less numbers through its surface; in the epiglottis, they are principally lodged beneath the membrane in the depressions or cavities of the cartilage. In a small proportion of cases of pulmonary tuberculosis, the laryngeal tubercles undergo the same pathological process as those in the lungs, and if, as is almost always the case, one lung only is involved, the first manifestations in the larynx will generally appear on the same side. As the ulcerative process continues, tissues and cartilages may gradually become involved and destroyed.

Symptoms.—The early symptoms of the affection are so insidious as hardly to be perceived. After a time, slight hoarseness is noticed, which is usually ascribed to the co-existing pulmonary trouble; a feeling of heat and dryness is experienced in the throat, accompanied by pain of a lancinating character, shooting occasionally to the ears. Deglutition becomes painful if the ulcerations involve the border of the epiglottis and the ary-epiglottic folds, but as a general thing, dysphagia only occurs later on. As the disease progresses, the hoarseness increases, and frequently the patient becomes completely aphonic. The pulse, temperature, and other general symptoms are those of pulmonary phthisis, but emaciation takes place more rapidly than in the latter affection, the odynphagia causing the patient to abstain from food as much as possible. When the disease has reached an advanced stage, dyspnœa supervenes, and that, added to the already difficult respiration occurring as a result of the pulmonary affection, causes the patient to suffer greatly. Tracheotomy is sometimes required. The cough incident upon the lung trouble, which under ordinary circumstances is not painful, becomes excruciatingly so in this affection, the pain continuing a good while. The sufferings of the patient continue to increase until death comes to his relief.

Upon examination in the early stage, the membrane of the larynx and the surrounding parts generally appears pale, a yellow tint pervading what pink may have remained. In some cases this pallor is so marked that the parts look perfectly blanched. A characteristic symptom occurring in the majority of the cases in which the affection first shows itself in the larynx proper, are pyriform swellings of either of the arytenoid prominences or sometimes both, looking like rounded cushions, which enlarge at the expense of the laryngeal aperture. They generally present the pale hue of the surrounding parts, but may appear quite red and occasionally livid. The mechanical impediment which they offer to the closure of the epiglottis, renders deglutition difficult, and liquids are prone to cause considerable annoyance by running into the larynx and causing violent coughing and gagging.

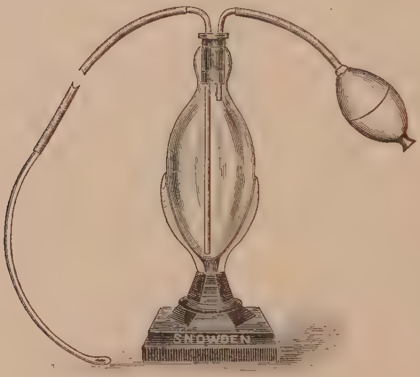
The vocal bands may appear hardly influenced by the disease for a considerable time after the early manifestations, but they generally show evidences of involvement very soon after, or simultaneously with them. They may appear highly inflamed and fiery, but they frequently do not present even the slightest redness, and spots of ulceration, forming indentations upon their thickened edges, may occur in such number, as to cause a dentated appearance, the free borders of the bands resembling the edge of a curry-comb. The voice, in these cases, becomes impaired almost with the outbreak of the local trouble, and is soon lost. Active inflammation, involving the entire larynx, is generally present, however, and small spots of ulceration, at first appearing like mere abrasions, with a grayish surface, may be met with in any part of the cavity, but most frequently over the arytenoid commissure, where they are usually covered by the secretions emanating from the diseased lung. These ulcerations gradually deepen and spread, the inflammation increasing at the same time. The general shape of the larynx may become completely altered, and the vocal bands, or what may be left of them, become hardly discernible amongst irregularly distributed swellings and ulcerated surfaces. In a small proportion of the cases, the ulcerative process begins in the membrane of the epiglottis, and rapidly spreads to the surrounding parts, involving sometimes the base of the tongue and the palatine folds. The epiglottis in these cases becomes infiltrated and swollen, and assumes the shape which causes it to be termed "turban" epiglottis, owing to its resemblance to a Turk's turban. In many instances, the first local evidence of the affection is a grayish prominence in the laryngeal aspect of the arytenoid commissure, often mistaken for a papilloma. It may be rounded or resemble pointed crests. I have seen it present a fimbriated appearance and involve the entire laryngeal surface of the arytenoid commissure. These papillary excrescences are not limited to this locality, however, but may be developed in any portion of the mucous membrane.

Prognosis.—Although a number of recoveries have been reported, even in cases in which the affection had advanced considerably, we can hardly hope to do much more than retard its progress, and thereby prolong for a few months the life of the patient. When the epiglottis is the first part of the larynx involved, the fatal issue is likely to occur at an early date.

Treatment.—Although the number of well authenticated successful results reported is not large, the possibility of recovery under appropriate treatment is sufficiently demonstrated to place the practitioner under the stress of considerable responsibility. In this affection, more perhaps than in any other, the life of the patient is, to a certain degree, in his hands; by his assiduous care he can certainly prolong it for a short time at least, and perhaps cure the disease. To Dr. F. H. Bosworth, of New York, the profession is indebted for the practical demonstration of this fact, and, although I can only add one successful case to several reported by him, it certainly serves to show the value of his suggestions, and to encourage renewed efforts in subsequent opportunities. The general outline of the treatment followed by him is as follows: (1) the thorough cleansing of the parts preparatory to the more special application; (2) the application of such mild astringents, alteratives, or resolvents as may be indicated; (3) the application of an anodyne to relieve pain or irritability, and to correct irritation caused by the previous remedies; (4) the application of iodoform as a specific in its action on ulcerations of mucous membranes.

For cleansing purposes, Sass' spray tube, used gently, is the most satisfactory instrument, the adhesive nature of the sputa requiring some slight mechanical force for its removal. I have generally found a solution of borax (gr. iv–℥j) most agreeable to the patient as a detergent spray, its disinfecting qualities being an important feature. The larynx being thoroughly cleansed, the anodyne is next in order; cocaine in this connection is of the greatest value, and a two per cent. solution, used with an atomizer throwing a fine spray, is not only exceedingly soothing, but it facilitates greatly the subsequent steps. If cocaine cannot be obtained, a five or ten grain solution of morphia, as recommended by Bosworth, may be used, a little bicarbonate of sodium being added to give it an alkaline reaction. The application of an astringent comes next; this should also be used with the atomizer, to avoid as much as possible the contact of instruments. I have found nitrate of silver (gr. ij–℥j) more satisfactory than tannin (gr. x–℥j), or sulphate of zinc (gr. v–℥j), producing less irritation. In some cases, however, the latter will perhaps be better borne. In using iodoform, I prefer the method proposed by the late Dr. Elsberg, *i.e.*, dissolving the drug in ether. I use a saturated solution, which is also applied by means of the atomizer. Powders cause an uncomfortable sensation of dryness, which lasts sometimes a couple of hours, while the cotton pledget, the brush or the sponge render mechanical irritation unavoidable. The atomizer reaching the desired spot as well, it should receive the preference. This treatment, which should be repeated at least every other day, is generally tedious to both patient and physician, but the relief furnished certainly repays the trouble. For the patient's use, I have of late prescribed the two per cent. solution of cocaine, to be used with the atomizer, just before eating, and sufficiently between meals to subdue pain. The effect produced is so satisfactory, that the patients are generally anxious to use the solution more frequently than directed to. Another convenient way to administer the cocaine, is to have it put up in the form of lozenges, gr. $\frac{1}{6}$ to the lozenge, one being used as often as required. Deglutition being facilitated, the sufferer is better nourished, while the diminished suffering is a source of great satisfaction. When deglutition becomes impossible through extensive ulceration, Bryson Delavan's alimentation bottle, shown in Fig. 81, may be employed to great advantage. A flexibe catheter of small size, replaces the ordinary stomach tube, and is introduced not into the stomach, but simply

Fig. 81.



Bryson Delavan's alimentation bottle.

below the pharyngeal constrictors, or beyond the seat of the difficulty. Cough is also greatly decreased. The general treatment is that indicated for the co-existing pulmonary trouble, tonics and stimulants forming the principal feature.

Should the dyspnœa become alarming, tracheotomy may become necessary. When it is performed, a temporary favorable reaction seems to take place, but unfortunately it is only of short duration.

SYPHILITIC LARYNGITIS.

(Synonyms :—Syphilis of the Larynx; Specific Laryngitis.)

Etiology.—Syphilitic laryngitis most frequently occurs as a manifestation of the tertiary period, from three to thirty years after the primary infection. As a complication of the secondary stage of syphilis, it may present itself from a few weeks to one year after. Primary syphilis of the larynx is extremely rare. Syphilitic laryngitis is more frequent in men than in women, this being explained by the fact that the former being more exposed, the throat is more frequently congested, and becomes an easier prey to the ravages of the affection. The influence of climate is shown by the greater frequency of the disease during winter than at other times of the year. It may also be due to heredity.

Pathology.—The pathological manifestations of syphilis in the larynx are extremely varied, and comprise the great majority of lesions that the disease can present. In secondary syphilis, the local lesion may consist of mere hyperæmia of short or prolonged duration, giving rise to the symptoms of simple laryngitis; this hyperæmia may be complicated with more or less deep ulcerations which heal spontaneously, or with condylomata, which may undergo ulceration or disappear of their own accord. In tertiary syphilis, hyperæmia is also the first manifestation, followed by ulceration, either starting on the surface or beneath the membrane, and progressing rapidly. It occasionally extends to the cartilages, and is liable to cause stenosis by the cicatricial contraction which follows resolution, when this takes place. Gummata are also of occasional occurrence.

Symptoms.—In secondary syphilis of the larynx, the symptoms are usually confined to those manifested in the course of an attack of simple acute pharyngitis, superficial ulceration of the mucous membrane or mucous patches, if they occur, increasing the local soreness and the inflammation. The voice is generally affected early, a peculiar, low-pitched hoarseness accompanying ordinary speech when the vocal bands are implicated. Pain in the surrounding parts and odynphagia are more or less prominent symptoms, according to the location of the laryngeal cavity presenting the ulceration. A short, hacking cough, with more or less expectoration of stringy mucus or muco-pus, is usually present. The suffering, in any of its features, is not to be compared with that of tuberculous laryngitis.

Examined laryngoscopically, the appearance of the larynx at first resembles so much that of subacute laryngitis that a differential diagnosis can only be established with great difficulty. Even if a clear history of syphilitic infection can be obtained, the true etiology of the manifestation can only be suspected, since the laryngeal inflammation can also be due to the ordinary causes of subacute laryngitis, without at all involving the general specific intoxication. A feature which assists greatly in the differentiation of the two affections when it is sufficiently marked, is the irregularity of the congestion in syphilitic laryngitis; it occurs more in spots, which seem to bulge out from the surface. These elevations may be numerous on one side of the larynx, while on the other they may be quite scarce, the vocal bands on the most affected side presenting more congestion than that on the other. This irregular appearance is by no means seen in every case, and, in the majority, further developments are necessary to establish a positive diagnosis. When mucous patches appear, their concurrence with patches under the tongue or other parts of the oral cavity, serves to differentiate the condition from any other. They most frequently appear upon the ventricular bands, the inter-arytenoid space and the epiglottis; they present the same appearance as in other localities—a regular outline with a slight inflammatory areola around them, and a whitish surface covered with a yellowish secretion. As a rule, and especially under appropriate treatment, they disappear after a week or two, leaving a reddish spot which gradually vanishes. Occasionally, they become irregularly covered with granulations, which sometimes assume sufficient size to require removal by surgical means. Condylomata are occasionally met with; they resemble small, yellow pimples on an elevated base. They generally disappear of their own accord.

Tertiary ulcerations usually present themselves on the epiglottis first, its edge or its oral surface being their favorite site. They then make their appearance in the laryngeal cavity and the trachea. Here, again, a certain amount of difficulty presents itself in the differentiation, but in this case, tuberculous ulceration and carcinoma are the local lesions with which it is likely to be confounded. In tuberculosis, however, the pulmonary symptoms, almost always present, assist materially in the differentiation, while the anæmic appearance of the pharynx and the soft palate, and frequently of the larynx itself, furnish further evidence; to these may be added greater local pain and dysphagia. In carcinoma, the pain is of a lancinating character, and usually very sharp, while in syphilis it is dull and continuous. The cachectic appearance of the skin, when present in cancerous individuals, is also of some assistance. Tertiary ulcerations differ from those of the secondary period in that they are deep instead of superficial, the pathogenic process beginning in the deep layers of, or beneath the membrane. and presenting elevations which finally break down. The ulcer formed is thus deep-seated from the start; it extends rapidly, both in breadth and in depth, seldom, however, involving the surrounding cavities or organs.

A peculiarity of syphilitic ulcerations, is that they frequently occur symmetrically on both sides, a spot of ulceration occurring on the ventricular band on one side, for instance, being often followed by another on the other ventricular band Their edges are ragged and sharp cut. and a deep red or purplish areola surrounds them. Their surface is covered with a greenish-yellow discharge, which is secreted profusely and contains shreds of necrosed tissue. A fetid odor is usually emitted, which renders the breath of the patient offensive. The epiglottis is often completely destroyed; when the ulceration extends to the other cartilages, these become partially or entirely necrosed, and are expectorated either whole or in pieces; the latter may endanger the patient's life by falling into the glottis and causing asphyxia.

Blood-vessels may become implicated in the ulcerative process and severe hemorrhage ensue. The ulcerative process is rapid and destructive, and if the disease is not arrested until the ulcerations have made much headway, the cicatricial contraction of the excavated tissues causes further deformity of the larynx, and bands of cicatricial tissue so limit the glottis or other parts of the laryngeal cavity as to interfere greatly with respiration, and sometimes to cause complete stenosis.

The subjective symptoms resemble, at the start, those of an attack of subacute laryngitis. Aggravation soon takes place, however, accompanied by local heat and pain, especially marked during deglutition; the expectoration assumes a purulent character and is quite profuse, being at times streaked with blood; the voice becomes hoarse, and complete aphonia follows, if the ulcerative process involves both vocal bands or the inter-arytenoid commissure. As the destruction of tissue and cartilage continues, these symptoms increase in virulence, deglutition becoming almost impossible.

Prognosis.—Under proper treatment, syphilitic laryngitis, even when far advanced in the tertiary period, is almost always curable. After the latter, however, considerable deformity generally occurs, compromising, in many cases, the physiological functions of the larynx, and endangering the patient's life.

Treatment.—In secondary laryngeal manifestations, the local treatment principally consists in frequent detergent sprays, to keep the laryngeal surface as free as possible from unhealthy secretions. This of course only applies to cases in which there is ulceration. A borax spray (gr. iv–℥j) applied three or four times daily, not only contributes materially to the patient's comfort, but advances the recovery. Astringents are recommended by some authors, but I have found them more irritating than beneficial. If the superficial ulceration seems stubborn, a sixty-grain solution of nitrate of silver, applied with a very small cotton pledget to each spot, after partially anæsthetizing the larynx with cocaine, will soon cause them to disappear.

Although the tendency of secondary syphilis of the larynx is to undergo spontaneous resolution, when the diagnosis is rendered positive by the mucous patches and the other evidences described, a mercurial treatment is indicated, not for the secondary manifestations, but to prevent as much as posble the tertiary stage of the affection. The red iodide of mercury, administered in doses of one-sixteenth of a grain three times daily, may be prescribed, and alternated, when ptyalism occurs, with iodide of potassium, ten grains night and morning. After continuing this treatment for six weeks or two months, Rabuteau's pills of carbonate of iron are of advantage if anæmia is present, one being taken after meals.

In tertiary syphilis of the larynx, internal medication is of primary importance. The system must, as soon as possible, be placed under the influence of an anti-syphilitic treatment, to check, in the briefest time, the ulcerative process. Mercurial inunctions, practiced three times a day, a piece of mercurial ointment as large as a cherry being rubbed into a different part of the body each time, is rapidly effective. The ulcerations show marked improvement after a few days, after which the inunctions may be reduced to twice a day. When ptyalism becomes evident, the mercury is replaced by iodide of potassium, which should in turn be given in large doses, beginning with ten grains, and gradually increasing at the rate of one grain per day until twenty grains are administered three times a day. While the drug is being used, the urine must be watched, and if it becomes scanty or its specific gravity becomes abnormally increased, prudence must be exercised lest œdema of the larynx occur. The larynx should be frequently and carefully examined, and if it shows unusual puffiness or the patient complains of dyspnœa, the iodide must either be decreased or discontinued as the case may be. This step is seldom necessary, however, and when the maximum dose of the salt has been administered, it can be continued as required, and decreased as it was increased, one grain per day. To prevent gastric disturbance, the iodide can be administered with tincture of cinchona bark. The salt should be dissolved in a little water by the pharmacist, prior to mixing it with the tincture, to insure proper solution.

Local applications are also very important, not only to assist the healing process, but to diminish the suffering. Cleansing solutions of borax (gr. iv–℥j), bicarbonate of sodium (gr. v–℥j) are very useful to detach the layers of pus which cover not only the ulcerations, but the adjoining parts. When this has been done thoroughly, a spray of four per cent. solution of cocaine is used to counteract the slight inflammatory exacerbation set up by the spray, and to slightly anæsthetize the larynx prior to the next application, which should be made at once. Iodoform is generally recommended, but I have not found it as effective as a one hundred and twenty grain solution of nitrate of silver, applied to each ulceration only, with a curved probe, covered at the tip with a thin film of cotton. The laryngoscope should, of course, be used. When the practitioner finds this measure difficult, iodoform may be used with the insufflator (Fig. 25). When cicatrization follows upon extensive ulceration, the adhesions formed may be of such a nature as to render tracheotomy and the permanent wearing of a tube necessary.

Cicatricial bands not admitting of dilatation, they should be divided when such division can restore the function of a part. An incision through a web connecting a portion of the edges of the vocal bands, for instance, will restore the voice and free respiration. Frequently, the motion of the epiglottis is restrained by a band passing from its edge to the ary-epiglottic fold; an incision through this band not only restores free motion to the epiglottis, but renders deglutition, which before was performed with difficulty, perfectly easy. The larynx is placed under the influence of a ten per cent. solution of cocaine, and the cicatricial tissue is severed. To prevent reunion of the cut edges, a probe must be passed between them every day until they are completely healed.

PLATE VIII.

PLATE VIII.

LARYNGOSCOPICAL APPEARANCE OF THE LARYNX, NORMAL AND DISEASED.*

Fig. 1.

IN ABDUCTION.

J. Epiglottis.
r. Ventricular band.
f. Vocal band.
z. Trachea.
m. Cartilage of Wrisberg.
d. Cartilage of Santorini.
g. Inter-arytenoid commissure.

Fig. 5.

SUBACUTE LARYNGITIS.

Female, opera singer, æt. 25. Rest, cocaine 2 per cent. spray, coca wine internally, saline purgatives.

Fig. 9.

CHRONIC LARYNGITIS.

Female, æt. 36, opera singer. Copper sulph. sol. locally, coca wine internally and lozenge No. 1. Case referred by Dr. Kyte.

Fig. 13.

FIBROMA OF LEFT VOCAL BAND.

Male, æt. 63. Removed with forceps.

Fig. 17.

PARALYSIS OF THYRO-ARYTENOID MUSCLES.

Female, æt. 35. Singer. Rest and electricity.

Fig. 21.

TUBERCULOUS LARYNGITIS.

Male, æt. 27. Same treatment as Fig. 20. Case referred by Dr. Valette.

Fig. 2.

IN PARTIAL ADDUCTION.

Omega-shaped epiglottis concealing anterior portion of larynx.

Fig. 6.

SUBACUTE LARYNGITIS.

Female, æt. 47. Infiltration; threatening œdema. Absolute rest. Jaborandi. Solution of buchu and uva ursi.

Fig. 10.

CHRONIC LARYNGITIS COMPLICATED WITH PARALYSIS OF THE ARYTENOIDEUS.

Male, æt. 28. Locally, zinc (gr. iv–℥j.), alternating with nitrate of silver. Sol. (gr. 60–℥j.) iodide of potassium internally; electricity afterwards.

Fig. 14.

FIBROMA OF RIGHT VOCAL BAND.

From Mackenzie.

Fig. 18.

BILATERAL ABDUCTOR PARALYSIS OF SEVEN YEARS' STANDING.

Male, æt. 47. Treatment proved useless. Patient refuses tracheotomy.

Fig. 22.

SYPHILITIC LARYNGITIS.

Male, æt. 24. Mercurials and iodides, nitrate of silver locally. Case referred by Dr. Mercur.

Fig. 3.

IN COMPLETE ADDUCTION.

Depressed epiglottis concealing two-thirds of larynx.

Fig. 7.

ACUTE LARYNGITIS.

Female, æt. 24. Accidental deglutition of aq. ammoniæ. Spontaneous resolution. Case referred by Dr. M. Hanly.

Fig. 11.

PAPILLOMA OF LARYNX.

Male, æt. 22. Stone-cutter. Removed with forceps, and cauterized base with galvano-cautery.

Fig. 15.

ABDUCTOR PARALYSIS, RIGHT SIDE, DURING INSPIRATION.

Female, æt. 48. Strychnia and iodide of potassium. Electricity.

Fig. 19.

TUBERCULOUS LARYNGITIS.

Female, æt. 24, sprays, morphia, etc. Case referred by Prof. S. D. Gross.

Fig. 23.

SYPHILITIC LARYNGITIS.

Female, æt. 27. Mercurials, iodides. Case referred by Dr. Minich.

Fig. 4.

CHILD'S LARYNX.

1^{1}. Glosso-epiglottic fold.
1^{2}. Palato- " "
j. Epiglottis.
v. Pyriform sinus.
g. Inter-arytenoid commissure.
w. Œsophagus.
y. Posterior wall of pharynx.

Fig. 8.

ŒDEMA OF LARYNX.

Complete closure of the glottis.

Fig. 12.

PAPILLOMA OF LARYNX.

Female, æt. 5. Tracheotomy. Extirpation with forceps and snare.

Fig. 16.

PARALYSIS OF ABDUCTION, ADDUCTION, AND RELAXATION OF RIGHT SIDE. BAND IN CADAVERIC POSITION. SHOWN IN ATTEMPTED PHONATION.

Female, æt. 61. Due to pressure of goitre upon right recurrent.

Fig. 20.

TUBERCULOUS LARYNGITIS.

Male, æt. 50. Sprays morphia, iodoform, and ether. Case referred by Prof. S. D. Gross.

Fig. 24.

CANCER OF THE LARYNX.

Epithelioma of left ventricular band. From Mackenzie.

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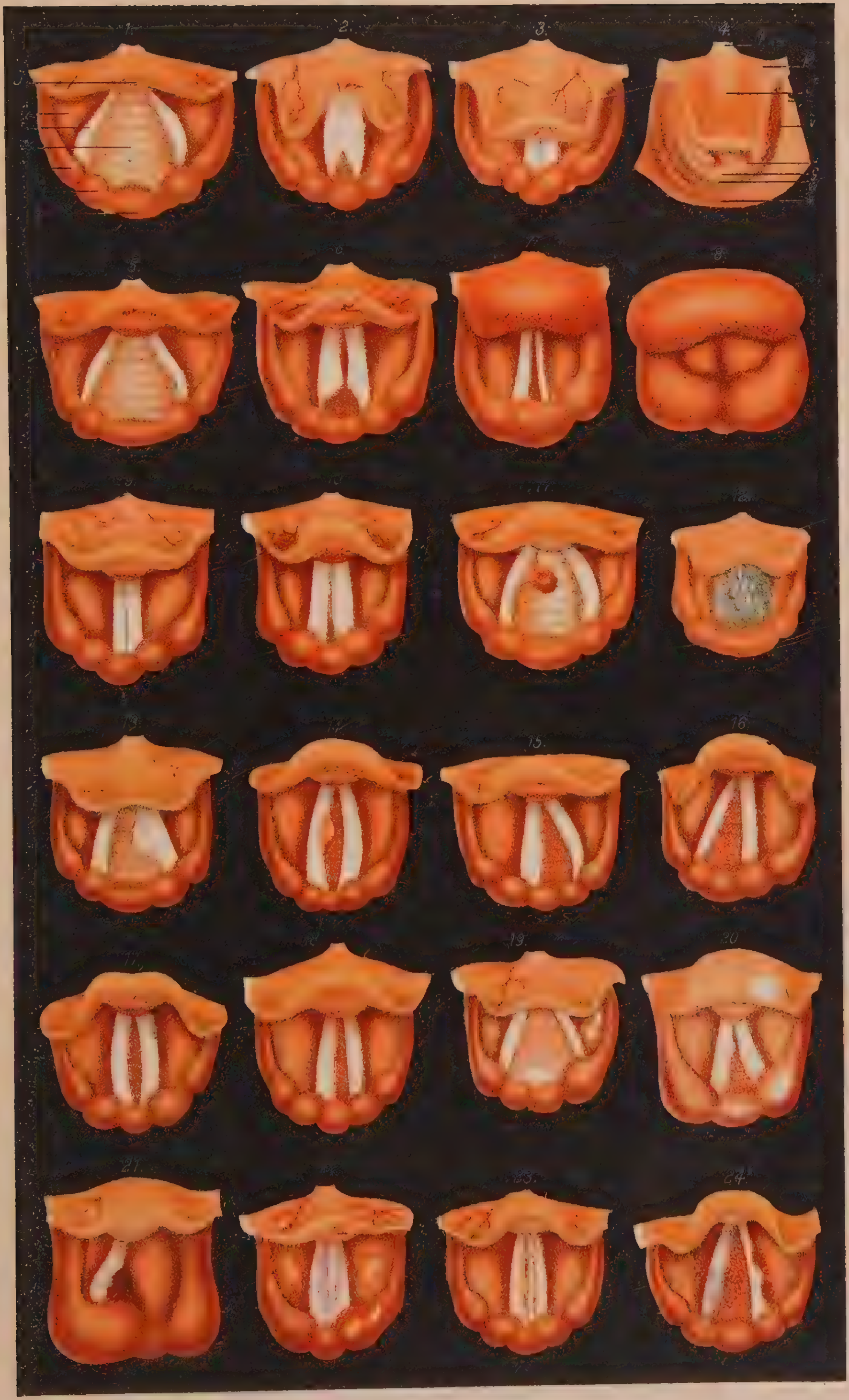
* Represented as seen by gas-light. By day-light, the red color appears much paler.

Plate VIII.



C. E. Sajous, Pinxit.

Burk & McFetridge, Lith. Phila.

CHAPTER XXVII.

DISEASES OF THE LARYNX—(*Continued.*)

NEUROSES.

MOTOR PARALYSIS.

Etiology and Pathology.—Motor paralysis of the larynx may be limited to one muscle or a pair of muscles, or involve several of them at once. It may be accompanied by paralysis of sensation. It may be limited to one side of the larynx—*unilateral paralysis*—or it may involve both sides—*bilateral paralysis.* The paralysis may be limited to the larynx or include the surrounding parts.

The causes of motor paralysis of the larynx may be divided into four classes: (1) disease or injury of the brain, involving the cerebral portion of the nerves which supply the larynx; (2) injury of, or pressure upon those nerves after they have left the cranial cavity; (3) an abnormal condition of the muscles themselves, through which their contraction is prevented; (4) a general systemic dyscrasia, through which the laryngeal muscles are debilitated and unable to respond to nervous influence.

The pneumogastric nerve, which supplies innervation to the larynx, arises on the floor of the fourth ventricle, where it lies in close contact with the origin of the spinal accessory and the glosso-pharyngeal nerves. Its filaments, after running downward and outward through the substance of the medulla oblongata, finally emerge and unite into a single cord, which passes out of the cranium through the jugular foramen, immediately beneath, in company with the spinal accessory nerve, and close to the glosso-pharyngeal, which passes out of the same foramen, but is separated from its companions by a membranous, sometimes bony, partition.

The experiments of Longet have demonstrated that the pneumogastric is, at its origin, exclusively a sensory nerve, and that its motor properties are obtained principally through its inosculation with the spinal accessory, after leaving the medulla. If, therefore, its function is interfered with at its origin by any abnormal condition, the symptoms will consist, in the larynx, of perverted sensibility or anæsthesia; but the close proximity of the roots of the spinal accessory, which is a motor nerve, renders the occurrence of anæsthesia of the larynx from such a cause very rare, the pathological process involving both roots conjointly in the majority of cases, if not at the outset of the local disturbance, at least very soon after. The same reason holds good for the corresponding nerve, the proximity of both pneumogastrics explaining the fact that in laryngeal paralysis of central origin, the paralysis is usually bilateral. Again, the fact that the glosso-pharyngeal also arises in close proximity, explains the frequent occurrence of paralysis of the parts to which it is distributed, in connection with laryngeal paralysis of cerebral origin. The intimate connection of the roots of the pneumogastric with the medulla, furnishes an explanation for the frequently observed concomitant symptoms of paralysis occurring in remote portions of the body. Syphilis, through the formation of gummata, is probably the most frequent cause of laryngeal paralysis of cerebral origin, to which tumors, apoplexy, multiple sclerosis, progressive bulbar paralysis, etc., may be added.

Upon emerging from the cranial cavity, the pneumogastric nerve presents a ganglionic swelling, the "jugular ganglion," which receives filaments from the facial, the hypoglossal, and the anterior branches of the first and second cervical nerves. Immediately below this ganglion, the pneumogastric receives an important branch from the spinal accessory, which supplies it with motor fibres. The first branch of distribution given off by the pneumogastric after leaving the cranium, is the superior laryngeal nerve, which passes downward and forward to the side of the pharynx, and there subdivides into two smaller branches—the internal, which passes through the thyro-hyoid membrane into the larynx, and is distributed to its mucous membrane. This branch is formed of fibres of the pneumogastric proper, and therefore supplies sensation. The second branch of the superior laryngeal, the external, is formed of fibres of the spinal accessory, which have become intermingled with those of the pneumogastric, and is therefore a motor branch. It does not penetrate the laryngeal cavity, but passes alongside of it, to be distributed to the thyro-cricoid, thyro-epiglottic and aryteno-epiglottic muscles, the only muscles not supplied by the inferior or recurrent laryngeal nerve. The pneumogastric then proceeds downward in the sheath of the carotid artery, and its next branch is only given off after it has entered the cavity of the chest. Here an important difference exists in the course taken by this inferior or recurrent branch on the two sides of the body. On the right, the pneumogastric descends in front of the subclavian, and its recurrent branch passes beneath that artery and over the apex of the right lung which lies under, and ascends obliquely towards the groove between the trachea and the œsophagus, until it reaches the larynx, passing behind the articulation of the thyroid and cricoid cartilages, where it joins the superior laryngeal. On the left side the pneumogastric is longer and passes in front of the arch of the aorta, and gives off its recurrent branch when opposite its lower curve. This recurrent branch winds around the aorta, and when behind it, ascends also in the groove between the œsophagus and the trachea, to be distributed to the left side of the larynx, in the same manner as the opposite nerve. Being given off from the pneumogastric nearer the median line of the body than on the left side, it does not approach so closely the apex of the left lung as its partner does that of the right.

The length of the pneumogastric nerve, and the relative position which it occupies throughout its entire course after emerging from the skull, causes it to be greatly exposed to pressure as soon as any of the surrounding structures, vessels, glands, etc., undergo a pathological process which induces temporary or permanent increase in size. From the inferior surface of the cranium down the chest, it is sufficiently close to the large vessels of the neck to become compressed by even a small aneurism, anywhere from the internal carotid above to the aorta below, on the left side, and to the subclavian on the right. Enlarged cervical glands, tumors of any kind, bronchocele, wounds with the point of a sharp instrument, severing the nerve or including it in a ligature during an operation, were the causes of some of the reported cases of laryngeal paralysis due to lesion of the pneumogastric nerve in its course along the neck.

The effect upon the larynx of any lesion arresting the function of the pneumogastric immediately below the cranium, which naturally induces paralysis of both superior and inferior laryngeal nerves, is complete cessation of all motion and partial loss of sensation on one side of the larynx. If the lesion is below the origin of the superior laryngeal nerve, the paralysis of motion is confined to the muscles supplied by the inferior laryngeal, while there is no loss of sensation.

The position of the superior laryngeal nerve and its comparatively short length, cause it to be but seldom involved in neighboring pathological changes. Its close proximity to the internal carotid, behind which it passes, exposes it to the presence of an aneurism in this location; tumors of the pharynx, or enlarged glands, may affect it in the same manner. Diphtheria most frequently causes impairment of the superior laryngeal nerve, by producing organic changes in its substance; these are generally, however, of but temporary duration.

Lesion of this nerve causes partial loss of sensation, and paralysis of the thyro-cricoid, thyro-epiglottic, and ary-epiglottic muscles in the lateral half of the larynx. The epiglottis can only be partially closed, while extension of the vocal band is prevented.

Lesions of the recurrent laryngeal nerve are the most frequent causes of paralysis of the larynx. On the left side, its close connection with the arch of the aorta causes it to be greatly exposed to pressure by aneurisms, which are frequent in this situation; the left carotid and the subclavian arteries are also the seat of aneurism sometimes, and, as they lie behind the recurrent branch, add to the danger of compression from this cause. On the right side, aneurism of the innominate or of the subclavian and carotid, may also cause pressure, but this occurs much less often than on the left side. The close proximity of the apex of the right lung furnishes another source of compression, through expansion or thickening of its parenchyma. On the left side, the nerve does not lie so closely to the lung, but is more exposed to pressure from bronchial glands, and other mediastinal growths and hardened masses of connective tissue.

An aneurism of large size may exert pressure on both recurrents and cause bilateral paralysis. As the nerves ascend, they gradually approach the œsophagus, carcinoma of which may induce pressure on one or both nerves. Another cause of bilateral recurrent paralysis, is enlargement of the thyroid gland, or bronchocele, which fills up the grooves between the trachea and œsophagus, compressing the recurrents which lie within them.

The effect of pressure upon the recurrent laryngeal nerves, should be, in all cases, paralysis of all the motor muscles of the larynx, except the depressors of the epiglottis and the thyro-cricoid muscles, which are supplied by the superior laryngeal. The prevailing opinion, at present, is that this is only the case when the lesion is of such a nature as to completely annul, either by great pressure, solution of continuity or disorganization, the conduction of nerve power. Felix Semon, of London, has advanced the opinion, supported by a large number of autopsies, that in all cases of organic disease or injury of the motor nerves of the larynx, there is either paralysis of the abductor muscles alone, or these muscles are affected earlier and more severely than any others; and that, if, in a case in which both the abductors and adductors are affected, recovery takes place, the adductors are apt to recover first or exclusively. This would seem to indicate a greater amount of vitality, if we may so call it, in the adductor than in the abductor fibres, this vitality enabling the former to resist the pathogenic causes longer and to recover sooner than their antagonistic fibres, which are easily influenced and the recuperative powers of which are much weaker. This explains the much greater relative frequency of abductor than adductor paralysis. Later experiments by F. H. Hooper, of Boston, however, indicate that Semon's theory can only be fully accepted, as yet, with reserve.

Paralysis of the laryngeal muscles is frequently brought about by an inflammatory infiltration of their substance. This is evidenced by the loss of voice attending some cases of subacute laryngitis. After a few days of hoarseness, in which the inflammatory process is limited to the surface, the voice becomes monotonous, in the true sense of the word, the extension of the inflammatory process to the smaller fasciculi of the thyro-arytenoid muscles rendering them unable to contract and to modify the pitch of the voice. The frequency of this monotonous voice in the course of even so slight an affection as subacute laryngitis, seems to indicate that the laxors, or vocal muscles, are easily influenced by surrounding inflammatory processes and that they are frequently paralyzed. This, however, cannot be considered as a true paralysis of these muscles, but a paresis of temporary duration.

Atrophy or degeneration of the muscles themselves, is another cause of motor paralysis. It is generally secondary, however, to some lesion affecting the nerve supply, although idiopathic changes may occur in the muscles independently of nerve lesions. The abductor muscles, the posterior crico-arytenoidei, appear to be the most prone to myopathic changes, the adductors, when they take part in the palsy, only losing their power after them.

A number of abnormal conditions of the general system, anæmia, rheumatism, syphilis, general poisoning through the use of various drugs, opium, belladonna, mercury, arsenic, etc., or through the continued inhalation or absorption of phosphorus, lead or arsenic, are occasional etiological factors in the production of motor paralysis. The excessive use of alcoholic beverages is another, but more frequent cause, according to Morgan, of Washington. With the exception of the diatheses named, however, true paralysis, occurring as a result of these conditions, is rarely seen, the local trouble consisting more of a paresis of temporary duration, which ceases some time after the discontinuance of exposure to, or the use of, the toxic agent.

Paralysis of Abduction.—As we have seen, abduction of the vocal bands is performed solely by the posterior crico-arytenoid muscles, which approximate the posterior angles of the arytenoid cartilages, causing wide separation of their anterior or vocal processes. If one of these muscles is paralyzed, therefore, we will have unilateral paralysis of abduction, and the vocal band will be seen in the mirror to remain in adduction, *i.e.*, parallel with the median line of the glottis. The subjective symptoms of this condition are so slight that they rarely attract attention. This is due to the fact that the breathing space left between the healthy vocal band and the motionless one is sufficiently great for ordinary breathing, while the approximation of the former to the latter, and the fact that paralysis of the thyro-arytenoidei muscles does not exist to interfere with modulation, causes the voice to be unaffected. Upon great exertion, however, some dyspnœa may be experienced, the abnormal size of the glottis preventing the access of a sufficiently great amount of air to the lungs.

When both posterior crico-arytenoid muscles are paralyzed, the symptoms, instead of being hardly noticeable, are of the gravest nature, owing to the constant and almost complete approximation of both vocal bands. A mere slit, hardly more than a line wide posteriorly, which represents the field of action of the arytenoideus, is the extent of the breathing space, which, during inspiration, is still more reduced by the pressure of the air current upon the horizontal surfaces of the vocal bands. In expiration, the contrary is the case; the outgoing current forces the bands apart, their inferior surface gradually sloping down towards the side of the trachea, and presenting therefore no flat surface upon which the expired current can impinge. The respiration is consequently greatly impeded, labored and frequently noisy in inspiration, and suffocation is likely to take place at any moment, especially during one of those spasmodic attacks of inspiratory dyspnœa to which these cases are subject, unless precautionary tracheotomy has previously been performed. The voice, however, is unimpaired, the complete approximation of the vocal bands being performed by the arytenoideus muscle.

Paralysis of the posterior crico-arytenoid muscles when bilateral, must of necessity be due to some condition implicating simultaneously the nervous supply of both sides. The causes must therefore reside in the brain centres or in the recurrent laryngeals, the pneumogastric nerves being too far apart, from their exit from the cranium down to where they give off their recurrent branches, to become simultaneously involved. In the brain, a tumor, for instance, in the neighborhood of the fourth ventricle or in the medulla, may cause pressure upon the roots of the pneumogastric and spinal accessory, paralysis of the abductor muscles occurring in that case, according to Semon, as the first manifestation of a lesion, to be followed, as the tumor increases, by paralysis of all the muscles of the larynx. Degeneration of the same, gives rise to the same train of symptoms. When a cerebral lesion is the initial cause, general concomitant symptoms are more or less evident. The recurrent laryngeal nerves, as we have seen, can be compressed simultaneously by aneurisms, cancer of the œsophagus and bronchoceles.

The lesion may be located in the muscles themselves, through disintegration of their substance by syphilitic ulceration, or a continued inflammatory process may cause them to assume a scirrhotic-like degeneration through impaired nutrition. A general toxæmia, such as that by lead, arsenic, etc., as we have seen, may also cause it, the lesion being probably located, as suggested by Bosworth, in an independent nerve-centre, which presides over the functions of these muscles.

Unilateral paralysis may result from a brain lesion and occur as the precursor of a forthcoming bilateral palsy of central origin. Unlike in bilateral paralysis, it may be due to a lesion of the pneumogastric nerve proper, in addition to the causes of bilateral paralysis, wounds, glandular swellings of the neck, etc., which can hardly cause bilateral paralysis; to these may be added, if on the right side, the proximity of the apex of the lung, and on the left, mediastinal tumors.

Paralysis of Adduction—Adduction of the vocal bands being performed by the lateral crico-arytenoid muscles, which draw the posterior angles of the arytenoid cartilages outward and cause the vocal bands to approach one another, paralysis of these muscles causes the vocal bands to remain in a state of extreme abduction. This condition is in most cases due to hysteria (hysterical aphonia, which will be described later on) and chlorosis, inducing weakness of the muscles through defective nutrition; rheumatism, either involving the muscles proper or the crico-thyroid joint, catarrhal inflammation, especially following a strain of the muscles in vociferating or screaming; injury, such as that caused by a firm grasp of the throat with the fingers; general poisoning by lead or arsenic, are among the causes cited. That adductor paralysis, either unilateral or bilateral, can be due to pressure upon the recurrent laryngeal without involving the other muscles of the larynx supplied by that nerve, seems to be very doubtful, and I am inclined to believe that in the cases reported with such an etiology, the bands were not in extreme adduction, but in the cadaveric position, an error quite possible if we note the slight difference between the two positions and the comparatively limited degree of abduction in some individuals.

If bilateral paralysis of the adductors exist, the vocal bands will appear in the mirror, separated to the utmost degree. The voice is completely lost, and the ability to cough or "hem" is also destroyed. If the patient tries to whisper, a marked loss of breath, occasioning great fatigue. accompanies his almost inaudible words.

In unilateral paralysis, one band only is seen to be in extreme adduction, and when an effort is made to sound the voice, the band on the normal side is seen to pass beyond the median line and to approach as nearly as possible to its motionless companion. Although aphonia also exists, the whispering is much more audible, and the phonative loss of breath, as it was termed by Ziemssen, is much less great.

To the form of paralysis of adduction above described, may be added paralysis of the arytenoideus muscle, which, however, is seldom affected singly, notwithstanding its exposed position between the arytenoid cartilages. Its object being to approximate the portion of the vocal bands behind the vocal processes, its paralysis prevents this action, and, although the bands are approximated in the anterior three-fourths of the glottis, a triangular space is left behind the vocal processes, through which air escapes during phonation. The voice is either completely lost, or so weak as to be hardly audible. In strong individuals, however, it may be comparatively strong, the phonative loss of breath being marked. It may be caused by catarrhal inflammation, or occur in the course of a local ulcerative process. Hysteria is also an occasional cause.

Paralysis of Tension.—Two forms of paralysis of tension may be met with: that due to paralysis of the thyro-cricoid muscles, which is of rare occurrence, and that due to paralysis of the thyro-arytenoidei, which is of frequent occurrence. Both may be unilateral or bilateral. The object of the thyro-cricoid muscles being to extend the vocal bands by raising the anterior portion of the cricoid ring, as demonstrated by Hooper, of Boston, and thus cause the arytenoid cartilages, which are supported on the upper edge of its seal-like portion, to draw on them, paralysis of these muscles causes the bands to remain in a relaxed condition. Instead of appearing tense and straight, they present a wavy line, their edges touch irregularly, and some parts of the bands are higher than others. During respiration they are sometimes seen to be influenced by the respiratory current, being depressed in inspiration and slightly bulged out in expiration. The voice is coarse, and remains in the same pitch; slight dyspnœa sometimes exists. The causes of this affection are generally traceable to direct injury to the muscles, choking with the fingers, blows in the neck, cuts, etc. It may also occur as a result of diphtheria, through organic change in the substance of the superior laryngeal nerve, or be due to some pressure upon the latter. In this case, however, it is associated with partial loss of sensation in the larynx and paralysis of the depressors of the epiglottis.

In the second form of paralysis of tension, or paralysis of the thyro-arytenoid muscles, I believe the lesion to be limited to the fasciculus lying parallel with, and close to the vocal band. Its object being to approximate its points of attachment, the anterior angle of the arytenoid cartilage and the retiring angle of the thyroid cartilage, it is in a state of constant tension. When paralyzed, however, this state of tension ceases, and the muscle is subject to the lateral traction of the diverging fibres of the second fasciculus which lies alongside. The vocal band is thus caused to assume a slight curve, especially marked in the centre, where the resistance to the lateral traction is least. When both bands are involved, an elliptical space can be seen between them during phonation. The voice is husky, high and weak, the air escaping through the elliptical space and necessitating great effort on the part of the patient to produce sound. He therefore tires quickly, a few phrases being a task.

The causes of this form of palsy are essentially local, and consist principally in prolonged or excessive use of the voice, straining in trying to attain notes above its compass, screaming and shouting. It may also be due to catarrhal inflammation, this being occasioned generally by using the voice during the attack of subacute laryngitis.

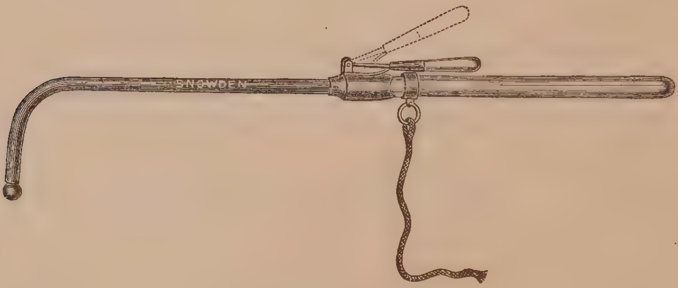
Paralysis of Abduction, Adduction and Relaxation.—The three forms of paralysis so far considered, may occur together, and involve either one side of the larynx or both. The terms "general" or "complete" paralysis would seem more adequate to express this condition, but as paralysis of abduction, adduction and relaxation can, and most frequently does, occur without involvement of the superior laryngeal nerve, which supplies the thyro-cricoidei and the depressors of the epiglottis, such terms would not express the true condition in the majority of cases, since, as we have seen, complete paralysis of the larynx can only occur when the lesion is in the brain, or if below the cranium, above the superior laryngeal branch. The abductors and adductors being involved, the bands are not subject to the action of either, and remain midway between adduction and abduction, *i.e.*, in the cadaveric position. Paralysis of the laxors of the vocal bands existing also, we should have the characteristic elliptical glottis, but such is not the case; the second fasciculus of the thyro-arytenoid being also involved in the palsy, does not cause lateral traction of the vocal band by means of its diverging fibres, and the evidence of paralysis of relaxation does not appear in the laryngeal image. The symptoms accompanying bilateral paralysis are of course complete loss of the voice, this being explained by the immobility of the bands. Phonative loss of breath is a marked symptom accompanying efforts at phonation. The differentiation of this condition from that of complete paralysis of the larynx, lies in the fact that in the latter, paralysis of the thyro- and aryteno-epiglottic muscles existing, the epiglottis remains upright over the larynx, rendering deglutition difficult and dangerous, this being aggravated by the partial loss of sensation. The thyro-cricoid muscle being also paralyzed, extension of the bands is not performed, and they present the wavy, relaxed appearance described under the heading of paralysis of tension.

The lesion giving rise to the bilateral affection must be located, as we have seen, in a region where the motor supply of both sides can be implicated at the same time. This being possible (except by the merest coincidence) only in the course of the recurrent laryngeal nerves, aneurism of the arch of the aorta, carcinoma of the œsophagus and bronchocele, are the affections which may be suspected as causations in a given case. It is perhaps unnecessary to repeat that were the lesion in the brain, the symptoms accompanying paralysis of the superior laryngeal, an erect epiglottis, loss of sensation, etc., would also be present.

In unilateral paralysis of abduction, adduction and relaxation, one band only is seen to be in the cadaveric position. The symptoms accompanying this condition vary greatly from those of the bilateral paralysis, being hardly perceptible in some cases. The paralyzed band lying midway between abduction and adduction, it is sufficiently near the middle line to be easily approached, during phonation, by the normal band, which is drawn beyond its usual limit by the healthy muscles, these being assisted by the arytenoideus, which assists both sides, and the innervation of which is compensated by the healthy side. The voice, therefore, may not be influenced beyond a slight hoarseness. At times, however, the compensatory adduction of the normal band is not sufficient to approximate the pair, and the voice may be impaired or lost, the phonative loss of breath being marked and causing great fatigue. Respiration is sometimes interfered with, especially during exertion. In this form of the affection, the field for a greater variety of causes is increased. It can be due, in addition to the lesions of the recurrent nerves, to some lesion of the pneumogastric from below the superior laryngeal down to where the recurrent laryngeal is given off. In addition therefore, to aneurism of the aorta and innominate, carcinoma of the œsophagus and goitre, we may have pressure upon the pneumogastric, induced by aneurisms along the entire course of the carotid artery, enlarged cervical glands, tumors, etc., the number of possible causes being further augmented by those to which the recurrent nerves are separately liable in the thorax, such as pressure from the indurated apex of the lung, etc., on the right, and aneurism of the aorta, etc., on the left, the majority of which have already been enumerated.

Treatment.—The many causes of motor paralysis of the larynx renders an exact delineation of the therapeutic measures to be adopted impossible. Whatever the etiological factor may be, however, the first indication is to treat it, and, if possible, eradicate it, the success of the measures employed depending, of course, upon the nature of the causative affection and its amenability to treatment. In some cases, especially when the laryngeal symptoms have not been of long duration, an amelioration takes place as soon as the disease to which the paralysis is due begins to yield to the therapeutic measures. Frequently, however, this is not the case, and measures must be adopted to stimulate the laryngeal muscles to action. For this purpose, electricity is by far the most potent agent. For its application, Mackenzie's laryngeal electrode, shown in Fig. 82, may be used. This being connected with the negative pole of a faradic battery, its extremity is introduced into the larynx, while the positive pole is connected with an ordinary surface electrode which the patient can hold over the larynx externally, or with a necklet which is secured around his neck. The extremities of both electrodes should be covered with sponge or kid to prevent the stinging that is produced when they are uncovered, and thoroughly wetted before each application. The manipulation of Mackenzie's electrode is like that of the ordinary laryngeal forceps, the mirror being employed to note and conduct the localization of the tip of the instrument. The nearer the paralyzed muscle the application,

Fig. 82.



Mackenzie's laryngeal electrode.

the better. The electrode being in position, the finger-rest on the top of the handle is depressed, and firm pressure is exerted on the neck by the other electrode. At first, this manipulation is quite difficult to perform, gagging and retching preventing the introduction of the instrument. After a few trials, however, the parts become more tolerant and the application can be borne, in the majority of cases, without trouble. Cocaine is of great assistance in difficult cases, and a general application, with a cotton pledget or an atomizer, of a ten per cent. solution, will anæsthetize the parts sufficiently to allow free manipulation at the first sitting. Each application should last but a few seconds, this being repeated several times at intervals of a couple of minutes. One sitting every other day is sufficient in most cases, this being continued until the return of the voice. After this has been accomplished, the sittings should be gradually decreased in number. Mackenzie's electrode has been modified by himself, Fauvel, Ziemssen and others, so as to enable both poles to be introduced into the larynx. No great advantage is obtained by these modified instruments, however, and the manipulation is rendered much more difficult.

Electricity may also be applied by placing one pole on each side of the larynx externally. Although much more easily conducted, this method of application is not nearly so effective as when one of the poles is placed in the larynx.

Strychnia, administered internally or hypodermically, the latter being the most effective, is a valuable adjuvant to the treatment by electricity. It may be administered in doses of one-sixtieth of a grain, gradually increased until one-twentieth of a grain is administered, the injections being given two or three times a week; if prescribed internally, it can be taken night and morning. At times this remedy is very effective; at others, it produces no effect whatever General measures, calculated to invigorate the system, are productive of much good, and advance the recovery, if such can take place.

HYSTERICAL APHONIA.

(Synonyms:—Hysterical Paralysis of the Vocal Cords: Nervous Aphonia.)

Etiology.—Hysterical aphonia is due to a paresis of the abductor muscles, occurring independently of any organic lesion, either of the muscles themselves or their nervous supply. It is less of a local trouble than a general one, however, consisting more of an inability on the part of the patient, through some momentary disturbance of the central co-ordinating powers to approximate the vocal bands sufficiently to make a sound, than a true loss of contractility of the muscular fibres or conductivity of the nerve fibres. Shocks, fear, anger, intense excitement, etc., represent one class of causes, which, occurring simultaneously with weakened resisting powers, are the primary element in a large number of cases. In others, no evident cause is apparent, the voice disappearing suddenly or gradually, sometimes returning in the same manner. It occasionally occurs as a manifestation of a remote trouble, especially affections of the uterus. Hysterical aphonia is limited to the period between the attainment of puberty and the menopause, occurring most frequently in unmarried women.

Symptoms.—The degree of aphonia depends upon the extent to which the vocal bands can be approximated. In most cases, however, there is complete loss of voice. In a small proportion, even the power of whispering is lost, through implication of the diaphragm in the paresis. In some cases, although the patient is unable to speak, she may be able to sing and cough loudly. The aphonia is sometimes intermittent, disappearing for a few days and returning after some days or weeks of perfect freedom. Upon examination with the laryngeal mirror, the bands are seen to approach the median line when an effort is made at phonation, but, instead of remaining together, they instantly separate, leaving an open space between them, consisting in some cases of a mere slit, and in others of a large, triangular opening. This peculiarity of suddenly approaching each other, is a characteristic of hysterical aphonia, the bands being either perfectly motionless or approximating sluggishly in true complete or partial paralysis.

Treatment.—The treatment of this affection consists in the local application of electricity and the internal administration of nerve-stimulants or tonics. The electricity can be applied as explained under the last heading, Morell Mackenzie's laryngeal electrode being employed. Frequently the first application causes the emission of sound for a few moments; in such cases, the progress is very rapid, and the voice soon returns. In some, however, weeks and even months are necessary, while in others, especially in cases of long duration, where atrophy of the muscles may have resulted from prolonged inactivity, no benefit is afforded. Of nerve stimulants, valerian, in the form of the elixir of valerianate of ammonia, is probably the most effective, a teaspoonful being given night and morning. The valerianate of zinc is another excellent preparation, one grain being administered every four hours. When anæmia exists, which is frequently the case in this affection, Rabuteau's pills, one after each meal, are productive of good results. Wine of coca seemed to be the only efficacious agent in one of my cases, all other means having failed. Nerve tonics, strychnia, nux vomica, arsenic, and quinia are of great assistance in some cases.

SPASM OF THE LARYNX.

(Synonyms:—Spasm of the Glottis; Laryngismus Stridulus; Spasmodic Croup.)

Etiology.—This is an affection of young children, occurring most frequently during the period of first dentition. A powerful predisposing cause is scrofula, especially when rickets is present. It is most common in bottle-fed children, and is often caused by injudicious nourishment, by allowing them to partake of food which their stomach is not yet able to digest. Children brought up in cities, and especially those who are kept in-doors almost always, are much more prone to it than those who live in the country and are in the open air most of the time. The affection is occasionally seen in adults. Spasm of the larynx may be due to the presence of a foreign body, or occur as a result of pressure upon some motor nerve.

Pathology.—The prevailing theory is that of Marshall Hall, who ascribed the affection to remote disturbances, operating reflexly upon the larynx. In teething, he believed that the impression was transmitted through the trifacial; in ill-nourished infants, through the pneumogastric, etc.

Symptoms.—The attack usually occurs at night, and is either single or followed by a number of others. The child wakes up suddenly, making strenuous efforts to take breath, this being attended by a peculiar inspiratory stridor. The eyes are turned, the hands and feet cramped, and opisthotonos may occur. This lasts a few moments, and ceases with a sudden loud inspiration, indicating the end of the spasm. Occasionally it continues until asphyxia takes place, the child dying in the midst of a convulsion.

When, as is most generally the case, recovery occurs, another attack may take place at any time, a week, a month, or perhaps a year after the first one, the growth of a tooth, the presence of food difficult to digest in the stomach, unusual excitement, etc., bringing on the paroxysm. The spasm is not accompanied by fever, pyrexia, or coughing, and, as soon as it is over, the child recovers his usual health. These peculiarities serve to distinguish the affection from others, especially croup, with which it might be confounded.

Treatment.—The usual treatment employed for convulsions in children can be used here, dashing cold water in the child's face, slapping his back, applying a piece of ice suddenly to the back of the neck, a few whiffs of ether or chloroform, ammonia or vinegar. If the mouth is opened, the tongue can be drawn out so as to raise the epiglottis, which becomes impacted in some cases, as shown by Cohen; or, the finger can be passed deeply into the throat to ascertain whether the epiglottis is impacted or not, and, if it is so, to release it by passing the finger under it. Titillating the back of the mouth with a feather, to provoke emesis, is another method which frequently succeeds. If hot water be at hand, a hot mustard foot-bath or a general warm bath is of service. If the attack persists, tracheotomy should be resorted to. The frequent recurrence of spasm of the larynx in some cases, renders prophylactic measures necessary. The administration of anti-spasmodics is indicated in conjunction with the treatment of the direct cause of the trouble. Tracheotomy as a precautionary measure is warranted in cases where, in adults, there is laryngoscopical evidence of a paresis of the abductor muscles.

CHAPTER XXVIII.

DISEASES OF THE LARYNX.—*(Continued.)*

TUMORS.

Tumors of the larynx are divided into three classes:—the *non-malignant*, also called benign tumors, which seldom return after removal; the *semi-malignant*, which do not always recur after extirpation; and the *malignant*, whose tendency is to return after removal, and frequently with increased virulence.

NON-MALIGNANT TUMORS.

Etiology.—The origin of non-malignant tumors of the larynx may generally be traced to cold, or to any cause which maintains a prolonged hyperæmia of the mucous membrane, such as mechanical irritation by dust, professional singing, chronic diseases involving the throat, etc. Coachmen, for instance, are greatly exposed to laryngeal neoplasms on account of the great amount of exposure to which they are subjected, while masons, stone-cutters, etc., are also prone to tumors, through the continued irritation brought about by the inhalation of quarry dust, etc. Diatheses, syphilis, scrofula or tuberculosis, bear no influence upon the causation of true benign growths; in fact the latter are most frequently observed in persons of general good health. During an active manifestation of syphilis or tuberculosis in the larynx, we may have, however, as already pointed out, growths simulating papillomata which are sometimes taken for them; but they present a marked difference in their development and course, being often of temporary duration.

They give rise to the same symptoms, and have frequently to be removed. Children and adults are alike exposed to laryngeal non-malignant tumors, while men are more frequently affected with them than women, through the greater amount of exposure to which they are subjected.

Symptoms.—The symptoms occasioned by the presence of a laryngeal tumor are alike in the different varieties; being due to the mechanical obstruction presented by the growth, their intensity is proportionate with its size, location and hardness. If the tumor is located upon one of the vocal bands, dysphonia is caused by the interference with its proper vibration, while if it is large and located between the bands at the anterior commissure, or attached to the edge of one of them, it causes aphonia, by presenting an impediment to their approximation. If the tumor is soft, it is liable to be compressed between the edges of the bands, and these will not approach each other sufficiently to permit perfect phonation. Again, if the tumor is not large and situated above the vocal bands, but slight, if any, subjective symptoms will occur, their incursions being free for the purposes of phonation and respiration.

Dyspnœa can only occur when the growth is sufficiently large to diminish markedly the lumen of the glottis. The location of the tumor plays another important part in the production of this symptom; the nearer the neoplasm to the vocal bands, the earlier will it interfere with respiration. As the growth of the tumor proceeds, the dyspnœa increases, and asphyxia may occur unless prompt relief is obtained.

Dysphagia is occasioned when the tumor is so situated as to interfere with the closure of the epiglottis upon the larynx, or when located upon the external or pharyngeal surface of the latter. Tumors of the epiglottis, which are not infrequently met with, give rise to the same mechanical impediment, when sufficiently large.

Cough is not present as a rule, unless the growth is sufficiently soft to be influenced by the air currents and to titillate the surrounding surfaces. It may also be caused by the interference presented by a large growth to the natural evacuation of the unusual amount of mucus formed, which accumulates in a limited area, and causes irritation. The tumor sometimes plays the part of a foreign body, and a pricking sensation is experienced, which causes a barking or brazen cough. Pain is seldom complained of.

Papillomata.—This class of growths does not present a characteristic appearance which enables a positive diagnosis to be made; they, however, possess certain properties in common, which render an approximate recognition of their nature possible. They are frequently sessile or broad-based; they are frequently multiple, and often present small, round projections, which cause them to be termed raspberry, mulberry, cauliflower, etc., because of their resemblance to them; they are usually located at the anterior portion of the larynx and on the vocal bands, near their anterior insertion.

Their color varies from a pale pink to a dark-red, while their size may be that of a millet-seed up to that of a walnut. Papillomata are much more frequently met with than any other form of laryngeal tumor. As to the likelihood of recurrence after extirpation, the following rules, according to Paul Bruns and Oertel (quoted from Morell Mackenzie), who divided papillomata into three classes, may furnish an approximate idea:—

First Class. Light-red, or dark tumors varying in size from a millet-seed to a bean, with uneven surface and broad base, sometimes solitary, but generally thinly scattered and never numerous, either do not recur at all, or only after some months.

Second Class. Whitish-gray, exquisitely papillary, warty or conical tumors, nearly always originating with a broad base from the vocal bands in adult patients, also recur very slowly, often not till after several years.

Third Class. Large reddish tumors, resembling a mulberry or cauliflower. They may be solitary, but are most frequently multiple, and are commonly seen in children. These generally recur after one or two months.

Fibromata.—Fibrous tumors present more definite physical properties. They are generally smooth and single; and, unlike the papillomata, are usually pedunculated. Their color varies from a bluish-gray to a dark-red, generally the latter, and their favorite site is also the vocal bands. They may be hard or soft, most frequently the former. They are seldom larger than a bean, being usually the size of a pea. These growths are not apt to recur.

The other varieties of tumors which grow in the larynx are very rarely met with. Among them may be mentioned *Angiomata*, which resemble a blackberry in shape and color. *Myxomata*, which are smooth or slightly irregular, pinkish or red and pedunculated, generally located near or in the anterior commissure, and *cysts*, which most frequently grow on the epiglottis, and present a round, smooth surface.

In addition to the laryngoscopic examination, the diagnosis of a laryngeal growth may be greatly assisted by the careful use of the laryngeal sound. The instrument shown in Fig. 62 reversed, can be very conveniently employed for the purpose; being malleable, it can be bent to any shape and used in any situation. The irritability of the larynx, however, does not allow of its repeated introduction, and under ordinary circumstances the tumor is hardly touched but that a contraction of the larynx occurs, and the instrument has to be withdrawn. In a case treated lately I applied a twenty per cent. solution of cocaine to the entire laryngeal cavity, and was able for a number of minutes to compress and generally manipulate a large soft papilloma situated in the anterior commissure without exciting the least reflex action.

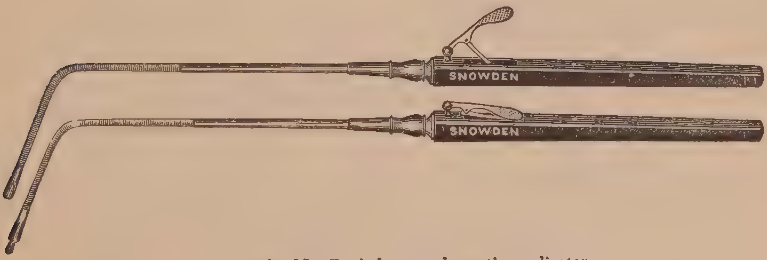
Treatment.—A laryngeal tumor may be destroyed by means of caustics, or galvano cautery, scraped off with the finger-nail, cut off with a knife, chain or wire écraseur, and crushed or extirpated with forceps.

Caustics are usually employed for small, soft growths which cannot be grasped with forceps, or when, for one reason or another, the latter cannot be used. Nitrate of silver and chromic acid are the most easily managed escharotics, and are devoid of danger if properly applied. The introduction of cocaine in our list of local anæsthetics has greatly facilitated the treatment of endolaryngeal tumors, and with its assistance an expert laryngoscopist can not only apply the agent to the tumor at every trial, but he can also locate the escharotic to any portion of that tumor. For the application of caustics, a twenty per cent. solution should also be used, being applied a couple of times at three minutes' interval.

The most satisfactory manner to apply nitrate of silver is to fuse it at the end of a laryngeal probe, by heating the latter to the fire of an alcohol lamp, then applying the heated tip against the caustic; enough will adhere for one application. The mirror being in position, the caustic is applied to the desired spot, the probe being manipulated as explained when speaking of the laryngeal forceps (p. 320). In experienced hands, however, and when cocaine cannot be obtained, a covered probe is preferable. A very convenient instrument for the application of caustics to the larynx is that shown in Fig. 83, invented by Dr. Alexander MacCoy, of this city. When the finger-lever is depressed, the outer tube is drawn upward, exposing the charged tip of the probe, which it covers. The outer tube being a spiral coil, the probe inside can be bent in any direction. Instruments of this kind, however, must necessarily present a rather large extremity owing to the outside tube, and the caustic cannot be as nicely localized.

The after-effects of these applications are comparatively *nil;* a feeling of fullness is sometimes experienced, and the expectoration is increased. At the next visit, three or four days later, a small indentation will be observed at the point of cauterization. Chromic acid is more effective, but a guarded caustic applicator should always be used for its application, owing to its greater destructive power.

Fig. 83.

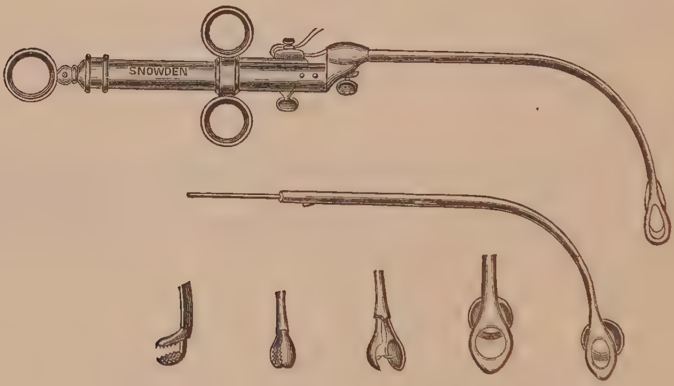


Dr. Alexander MacCoy's laryngeal caustic applicator.

Soft tumors, situated high up in the upper portion of the larynx, can be scratched off with the nail of the index finger, as recommended by Cohen; this is especially applicable for operations in children. A small probe-pointed or spear-shaped bistoury, mounted upon a suitable handle, is used by some authors to shave the growth off, when it is located at the margin of one of the hands. The drawback to this operation, however, is the likelihood of copious hemorrhage and the dropping of the severed tumor into the trachea. Pedunculated growths can be cut off by means of the cold wire or galvano-caustic snare. These also present the disadvantage, however, of frequently allowing the cut portion to fall into the windpipe. When cocaine is used locally, the contraction of the larynx, which detaches the tumor from the loop (to which it generally adheres), does not take place, and it can generally be brought up. The galvanic snare cauterizes the base of the tumor, while passing through it.

Stoerk's guillotine and tube-forceps, shown in Fig. 84, are much employed in Europe for the removal of laryngeal growths. The tube mounted upon the handle is that of the guarded snare, while the disengaged tube below, represents the smaller guillotine in the act of penetrating a growth; in succession then come the larger guillotine, a toothed claw for tumors, a smaller claw for foreign bodies and pedunculated growths, and a horizontal claw for neoplasms located in the anterior and posterior commissures and on the edges of the vocal bands.

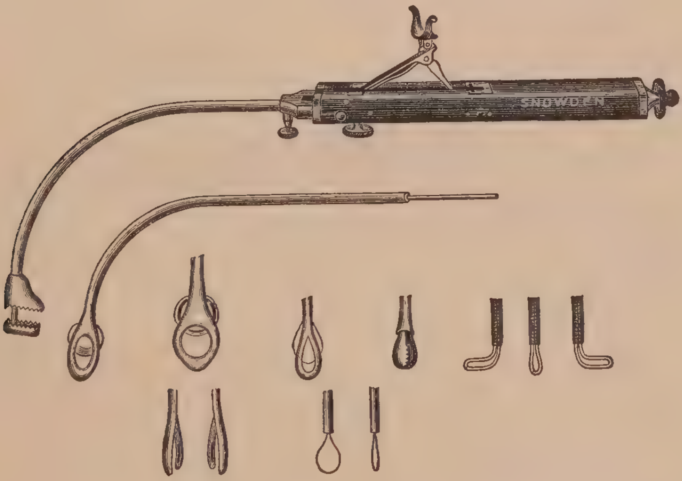
Fig. 84.



Stoerk's guillotine and tube-forceps and attachments.

In Fig. 85, the horizontal claw, which can, in this instrument, be rotated in any direction, is mounted upon the handle; two guillotines, a guarded snare, and a small claw for foreign bodies and pedunculated growths, are then shown. Next come galvano-cautery instruments, for the destruction of small tumors or for cauterizing the seat of neoplasms removed with forceps, guarded platinum points for the same purposes, and, finally, galvanic snares for the removal of hard neoplasms. In using galvano-caustic instruments, the battery used must be sufficiently powerful to heat the metallic loop to a cherry-red at once, so as to avoid prolonged radiation.

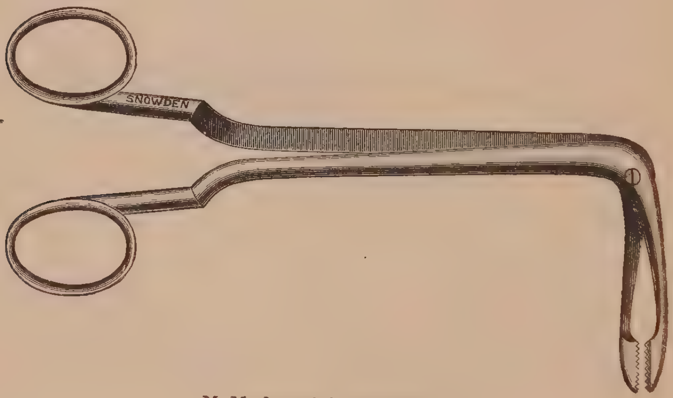
Fig. 85.



Author's universal handle and laryngeal attachments.

The above outlined methods for the removal of laryngeal neoplasms are very seldom employed as compared with evulsion by means of the forceps. A great variety of these instruments are at our disposal, best known among which are Morell Mackenzie's (Fig. 86), Fauvel's (Fig. 87) and Cusco's (Fig. 88). As can be seen in the cut, Mackenzie's forceps have a much sharper curve than the other instruments, the object of this being to avoid touching the epiglottis during the operation. Before the introduction of cocaine, this was an advantageous feature of the instrument, one of the causes of spasmodic irritation being thus avoided. When the surface of the epiglottis can be anæsthetized, however, an instrument with a rounded curve such as that in Fauvel's or Cusco's forceps, is preferable; the concave portion of the curve, by resting upon the epiglottis, raises it up completely, thus increasing the field of vision to its greatest extent. For large tumors, Fauvel's forceps are perhaps the most satisfactory, the perpendicular position of the claws, when opened, permitting them to seize with great firmness.

Fig. 86.

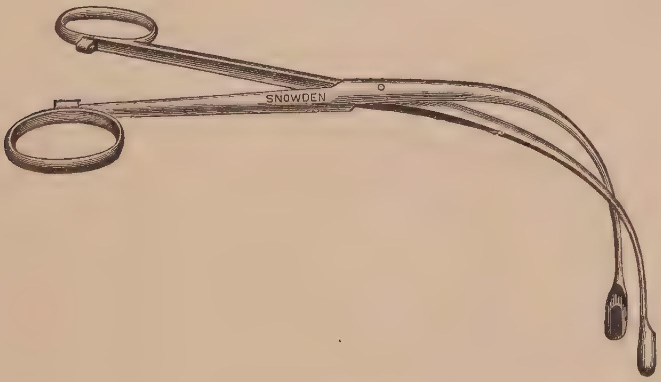


M. Mackenzie's laryngeal forceps.

For small growths, Cusco's is an excellent instrument, its free and delicate action and convenient shape enabling it to be used with very little motion of the hand. Different shapes of these several instruments must be kept on hand to suit the different cases.

The operation for the evulsion of laryngeal growths by forceps is greatly facilitated by the use of cocaine. Without it, the larynx has to be trained, in almost every case, to the contact of instruments, by introducing the forceps to be used every day or two, until it can stand their presence without reflex contraction. With cocaine, however, such is not the case, and the operation can be performed at the first sitting if necessary. In a case lately operated upon, the anæsthesia produced by a twenty per cent. solution was so great that I could touch any portion of the larynx with the greatest ease, without exciting the slightest irritation. The tumor, a large papilloma, was taken out in two sittings without preparatory training. Not less than a twenty per cent. solution should be used, and that should be applied thoroughly at least twice, at three minutes' interval. A point of importance in this connection is the rapidity with which the anæsthesia passes off; unlike in the nose, the effect of cocaine in the larynx only lasts at most ten minutes, this being probably due to the great amount of secretion which accompanies its application. In the case above alluded to, a translucent mucoid liquid could be seen streaming out of the ventricles, the vocal bands being literally bathed with it. No time should be lost, therefore, after the application of the anæsthetic.

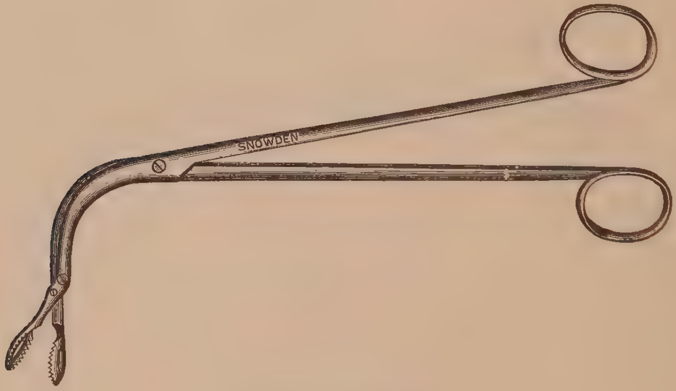
Fig. 87.



Fauvel's laryngeal forceps.

The tongue being held by the patient and the mirror placed in position, the forceps, previously warmed, are introduced cautiously into the larynx and the tumor is grasped between its claws, these sinking slightly into the seat of implantation. Care must be taken to hold the growth firmly; if it is allowed to slip out, a slight hemorrhage will occur which will obscure the view and render further steps more difficult. It is then pulled off by raising the anterior portion of the instrument, the growth being generally brought out entire. I have found it advantageous to blacken, by exposing it to fire, about a quarter of an inch of the extremity of my laryngeal forceps. It can be followed more easily with the eye and its location can be ascertained with much more accuracy. Polished instruments reflect the surrounding surfaces and appear of the same color. Large growths can be taken out piecemeal at different sittings.

Fig. 88.



Cusco's laryngeal forceps.

A slight hemorrhage usually follows this operation, but it soon ceases. The symptoms occasioned by the presence of the tumor are at once relieved, except the aphonia or dysphonia, which, however, generally disappear after a few days.

If the vocal bands are damaged in the course of the operation, or involved in the tumor, hoarseness is likely to follow. Measures for the removal of tumors by surgical means are occasionally followed by spasm of the glottis and other untoward symptoms which may endanger the patient's life. Lennox Browne, of London, has had occasion to perform tracheotomy after an operation for a benign growth, followed by spasm of the glottis. It is probable that with due care such a result cannot occur.

The removal of tumors is sometimes performed from without, owing to the impossibility of getting at them through the mouth; the larynx may be opened anteriorly by an incision through the angle of the thyroid cartilage, an operation first performed by Ephraim Cutter, of New York. The tumor being then removed, the wound is closed up; it generally heals spontaneously. Tracheotomy is sometimes performed a few days in advance, so as to avoid the risk of asphyxia.

Rossbach, of Wurzburg, introduces a thin knife antero-posteriorly into the median line of the cavity of the larynx from without, and amputates a tumor situated on the edge of the vocal band, watching the operation in the laryngeal mirror held in the usual position.

SEMI-MALIGNANT TUMORS.

Sarcomata are the only growths that can be termed semi-malignant, owing to the possibility of cure which attends their removal. They are rarely met with in the larynx. Their growth is generally very rapid and they may attain such size as to render extirpation through the mouth impossible. They may spring from the cavity of the larynx, usually from the upper part, or from its external wall. Their appearance varies greatly, resembling in some cases a papilloma, and in others a fibroma. In a case seen by me, the growth was rounded, dark and sessile, and about the size of a large pea. The surface, instead of being smooth, is often quite irregular. This irregularity of appearance, however, renders a differential diagnosis with other tumors a rather difficult matter, which the microscope alone can render positive.

The symptoms of this form of tumor vary with the location of the growth. In the larynx, its pressure presents a mechanical obstruction to respiration and phonation, asphyxia sometimes resulting; when upon its external surface, the growth offers an impediment to deglutition.

A small sarcoma can be removed by any of the methods described for non-malignant tumors. When too large to be removed through the mouth, thyrotomy or extirpation of the entire larynx may become necessary, according to the location and size of the growth.

MALIGNANT TUMORS OF THE LARYNX.

The malignant growths found in the larynx comprise principally the three varieties of cancer—*epithelioma*, *encephaloid* and *scirrhus*—the first being by far the most frequently met with. They may occur primarily, or as a secondary manifestation of a cancer in other organs, or through extension from neighboring parts. A malignant growth seldom presents itself before the fortieth year, and is much more frequently met with in males than females. It can frequently be traced to heredity. In persons in whom a hereditary proclivity to carcinoma exists, it is probable that undue exposure of the throat to cold, continued irritation by excessive smoking, etc., may, by maintaining a local congestion, encourage the development of a growth which might not otherwise have shown itself.

Symptoms.—The early symptoms are generally not marked. Hoarseness is the first source of complaint, presenting itself sometimes long before the active symptoms. As the disease progresses, however, they become more and more distinct, until much suffering is incurred, its nature depending upon the location of the cancer. If located high up, marked odynphagia may exist in conjunction with the pain of the growth proper, which is sharp and lancinating. If the cavity of the larynx is the seat of the tumor, phonation is more and more difficult until complete aphonia exists, and dyspnœa becomes a prominent symptom early in the history of the case. When ulceration begins, the suffering is frequently increased by violent shooting pains, extending to the ears, orbit and forehead. The breath at this time becomes very fetid, and repeated hemorrhages may occur; the latter, in conjunction with the small quantity of food taken, weakens the patient greatly and advances the fatal issue. The cachectic appearance is only present in cases of long duration.

The laryngoscopic appearances vary according to the variety of cancer present and, of course, to the stage of the disease. In the great majority of cases, the seat of the cancer is on one of the ventricular bands. In the early stages, the affected band is irregularly thickened, nodules appearing here and there which present either a grayish-red or a dark-red color. In epithelioma, the grayish-red color predominates, and, as shown by Fauvel, as soon as ulceration begins, vegetations show themselves around the edge of the ulcer, and, breaking down in turn, rapidly increase the loss of substance; in encephaloid cancer, the vegetations spring from the surface of the ulcer and do not involve the surrounding tissues, the loss of substance taking place by gradual extension of the primary ulcer. Scirrhus cancers resemble non-malignant growths at the beginning, especially fibromata, being also hard to the touch of the probe. It soon becomes inflamed and opens, a deep, excavated ulcer being formed, which gradually increases at the expense of the surrounding parts. Death takes place earlier in the first variety than in the others, a year frequently being the extent of life after the symptoms have become recognizable.

Treatment.—The constant recurrence characterizing malignant growths precludes the employment of curative measures other than complete evulsion, this involving, to be done thoroughly, the entire larynx in many cases. Extirpation of the larynx is, in itself, so rarely successful as to scarcely be warrantable. Tracheotomy, performed early, retards the fatal issue on an average about nine months, according to Fauvel, not only through the fact that free respiration is secured, but also on account of the rest procured for the larynx.

Palliative measures, properly conducted, are very valuable in insuring, for the patient, comparative comfort. A borax spray, to render the discharges liquid and thus facilitate their expectoration, is generally grateful to the patient, avoiding for him the painful scraping and hawking necessary to accomplish the same object. A four per cent. solution of cocaine, increased in strength as the parts become accustomed to its effects, or lozenges containing from gr. $\frac{1}{6}$ to $\frac{1}{2}$ of the drug, may be used with great benefit to subdue the pain and facilitate deglutition. Morphia gr. $\frac{1}{8}$ to $\frac{1}{4}$, gently insufflated over the ulcerated parts, is also very effective. When deglutition becomes very painful, the alimentation bottle of Bryson Delavan (Fig. 81) is admirably adapted to nourish the patient and thus counteract one of the frequent causes of death in cancer, inanition.

FOREIGN BODIES IN THE LARYNX.

A list of the different kinds of foreign bodies that have become impacted in the larynx would include almost every article capable of being introduced into the mouth. Those which most frequently become lodged there, however, are principally articles of diet, bones, bread-crusts, fish-bones, etc., which are drawn into the air-passages during a fit of laughter, just as the act of deglutition is being performed. Their penetration into the air-tract depends greatly upon their size, small objects being frequently drawn down into the trachea, while large objects remain in the upper part of the cavity. The symptoms of a foreign body may be due to impaction of a portion of the epiglottis in the larynx proper. Teeth, natural or artificial, pieces of necrosed bone or cartilage, coming from the naso-pharynx, or the larynx itself, represent another class of foreign bodies which occasionally cause occlusion.

Symptoms.—The sudden impaction of a foreign body in the larynx provokes immediate and violent coughing—a reflex effort to dislodge the offending object. Sometimes this succeeds, the foreign body is coughed up and out, and the patient recovers at once, although his throat may remain painful for several days. When the foreign body is large enough to fill the laryngeal cavity sufficiently to occlude it, and the first expulsory effort does not succeed, the patient, having comparatively emptied his lungs of air, finds it impossible to inhale, each effort causing the offending object to impact itself more tightly in the glottis. As graphically described by the late Professor Gross (quoted by Cohen), "the patient is seized with a feeling of annihilation; he gasps for breath, looks wildly around him, coughs violently, and almost loses his consciousness. His countenance immediately becomes livid, his eyes protrude from their sockets, the body is contorted in every possible manner, and froth, and even sometimes blood, issues from the mouth and nose. . . . . . The heart's action is greatly disturbed, and not infrequently the individual falls down in a state of insensibility, unable to execute a single voluntary function." When the entrance of air is completely prevented, the sufferer may die in a few moments, and before any assistance can be lent him. Pieces of meat are the most frequent causes of such an accident, their consistence permitting them to adjust themselves to the sinuosities of the laryngeal aperture. In the great majority of cases, however, the object is of such a shape and form that sufficient air is permitted to enter the lungs to keep the patient alive. In this case, the first paroxysm, although severe, soon subsides; violent paroxysms of coughing follow, and, after a few minutes, comparative comfort is enjoyed until another coughing spell brings on dyspnœa and a renewal of the first symptoms. After a time, the larynx seems to become accustomed to its new occupant, and a small object may even be forgotten and ejected in a fit of sneezing or coughing long after. In many cases, however, such is not the case, and organic lesions may be caused which may endanger the patient's life. The inflammation occasionally extends to the lungs, and a fatal result may be caused by pneumonia. Again, notwithstanding the spontaneous expulsion of a foreign body, secondary inflammation may follow and endanger the patient by œdema of the larynx.

Treatment.—The simplest means are sometimes sufficient to dislodge an impacted body. A violent slap on the back, just as an expulsory effort is being performed by the patient, often succeeds. In a case under my care, a large piece of bone, which occluded the cavity of the larynx almost entirely, judging by the amount of dyspnœa present, was thus dislodged. At times, the object remains over the aperture and can easily be removed with the finger. As we have seen under the heading of foreign bodies in the pharynx, the epiglottis may be held down by the impacted body so as to completely close the laryngeal aperture; the finger can also be used in this case.

When the foreign body presents a certain degree of weight, such as a piece of coin, a bullet, etc., an effort may be made to cause its fall from the larynx by inverting the body, the patient standing on his hands while his feet are held up; or he may be placed, face downward, on a table, one end of which is then raised as high as possible.

Pins and needles, tacks, bones, *i.e.*, objects having a tendency to penetrate into the tissues when efforts at expulsion are made, which causes them to increase their hold, can be withdrawn by means of forceps with the assistance of the laryngeal mirror. Before cocaine was introduced, this was an exceedingly difficult procedure. The larynx, through the pressure of the foreign body, becomes much more sensitive than usual, and the mirror can hardly be borne, let alone the forceps. In the midst of the retching and gagging, which occurred in most cases, the forceps had to be introduced, and advantage taken of an effort at inspiration to seize the object and draw it out. With cocaine, however, the operation is greatly simplified; a twenty per cent. solution applied generously to the laryngeal membrane and all the parts around the larynx, including the epiglottis and the base of the tongue, so anæsthetizes the throat as to render the extraction of the foreign body a comparatively easy task. Seiler's tube forceps (Fig. 69), is perhaps the most convenient instrument to grasp small objects, while Fauvel's (Fig. 87) may be used for large ones.

When the foreign body cannot be reached and suffocation is threatened, tracheotomy is the only resort, and should be performed. If the necessary instruments are not at hand, the trachea may be opened with a penknife and the wound kept patulous with bent hairpins, secured by means of a piece of tape passed around the patient's neck; or, the thyro-cricoid membrane may be divided, thus furnishing a sufficient opening for the admission of air until more decided measures can be adopted. Before doing this, however, it is advisable to ascertain as nearly as possible the location of the foreign body, to avoid making an unnecessary opening in case it should have fallen into the trachea. The location of the foreign body may be ascertained by auscultation, a whistling noise being audible at the point of impaction; a stethoscope may be used for the neck.

Tracheotomy is occasionally performed to enable a foreign body impacted in the trachea to be coughed out. In this case, the opening made in the windpipe should be longer than for the introduction of the canula, one inch and a quarter for an adult and about one inch for a child being the extent recommended by Professor Gross. The spontaneous extrusion of the foreign body is thus greatly facilitated.

Cocaine, it seems to me, could be used to great advantage for the mechanical removal of foreign bodies located in the trachea, and especially in either bronchi, through a tracheal opening. For the removal of an object located above the wound, thorough anæsthesia of the larynx from above, and also from below, by means of a small atomizer with a curved tip, using a twenty per cent. solution, would enable a small mirror to be introduced into the trachea, through the wound, without provoking cough. A probe, curved upward, could then be passed in, and the foreign body pushed up into and out of the larynx. The operation can thus be conducted in the safest possible manner, and be accomplished much more rapidly. A foreign body impacted in one of the bronchi, will readily be seen by introducing the mirror with its face downward; the anæsthetic having been carefully applied, its exact location, shape and surroundings can be ascertained, and a suitable forceps employed for its extraction.

CHAPTER XXIX.

ARTIFICIAL OPENINGS INTO THE LARYNX AND TRACHEA.

Artificial openings into the larynx and trachea are most frequently made to secure the access of air to the lungs, when, through some obstruction in the larynx or trachea, respiration cannot take place through the natural channels. They are also occasionally made for the purpose of removing neoplasms and foreign bodies from the larynx and trachea, when withdrawal through the mouth is impracticable.

The different operations that can be performed are:—*laryngotomy*, *thyrotomy*, *laryngo-tracheotomy* and *tracheotomy*.

LARYNGOTOMY.

Laryngotomy is the simplest of the operations for the artificial admission of air into the respiratory tract. It is principally useful when the obstruction to normal respiration is to be of short duration, such as the presence of a foreign body, œdema of the glottis, and fracture of the larynx. It consists in making an opening through the crico-thyroid membrane. The patient being placed on a table, his shoulders are raised so as to cause extension of the neck. A vertical incision being made through the integument, in the median line, beginning at a point about representing the middle of the thyroid cartilage, and extending downward to about the first tracheal ring, the handle of the scalpel is used to uncover the crico-thyroid membrane, over which will be seen coursing the crico-thyroid artery and vein. These being pushed aside, a transverse incision is made through the membrane, taking care to penetrate the mucous membrane of the trachea. A canula (that generally used being flattened from above downward, instead of round) is then passed into the larynx, and secured by means of tapes tied around the neck. The canula, in this operation, should not be left *in situ* for any length of time, owing to the danger of necrosis of the thyroid or cricoid cartilages. The after-treatment is the same as that for tracheotomy, and will be described under that heading. When the canula is withdrawn, the parts usually heal without trouble. The operation is occasionally performed for the extraction of foreign bodies or neoplasms, which cannot be withdrawn by the ordinary methods.

THYROTOMY.

This operation consists in separating the two wings of the thyroid cartilage anteriorly, thus exposing advantageously the cavity of the larynx for the removal of tumors or foreign bodies which have resisted the ordinary procedures.

The thyroid prominence being rendered as marked as possible by raising the patient's shoulders and tilting his head backward, a perpendicular incision, beginning at the thyrohyoid space and ending at the cricoid cartilage, is made exactly in the median line, and the underlying fasciæ are divided carefully, using the grooved director. As soon as this is done, the thyroid prominence bulges out of the wound, and can be opened by passing a sharp and strong bistoury under its lower edge, cutting upward. When the cartilage is ossified, a pair of bone forceps or a fine saw, such as that shown in Fig. 46, has to be used. A pair of hooks or retractors are then adjusted to the sides of the opening, and held in position by means of tapes passed around the neck. The operation is a comparatively bloodless one, and exposes, in a very satisfactory manner, the interior of the larynx. When the foreign body or the tumor has been removed, careful apposition of the cut surfaces will generally be followed by union by first intention. The voice is usually affected for a certain period after, but it almost always returns to its normal condition.

LARYNGO-TRACHEOTOMY.

When after either of the two operations just described the opening is not sufficiently large for the purposes required, laryngo-tracheotomy becomes necessary. It consists of an extension of the incision made, either in laryngotomy or thyrotomy, to the cricoid cartilage, and dividing the latter and the first ring of the trachea. Care should be taken not to cut below this limit, lest the isthmus of the thyroid gland, immediately below, be divided, and give rise to profuse hemorrhage. An extended view of the larynx and trachea is thus obtained. The cricoid cartilage is sometimes penetrated with difficulty, owing to ossification, rendering the use of a saw or bone forceps necessary.

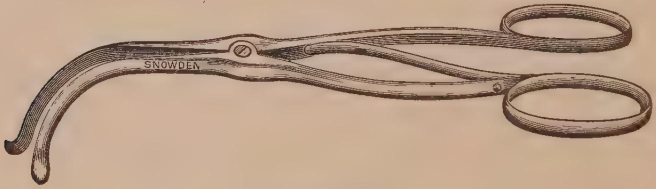
TRACHEOTOMY.

Tracheotomy, or opening of the trachea, is resorted to much more frequently than any of the other operations. It is performed in the following manner: The patient being anæsthetized, he is placed on a table, and the shoulders are raised to cause extension of the neck. A line representing the location and length of the incision, extending from the cricoid cartilage to within a third of an inch from the top of the sternum, is traced with ink, so as to avoid losing the middle line. The skin is then raised by pinching it up in a transverse fold with its apex at the middle of the ink line, and the bistoury is passed through the fold, the sharp edge being upward. The transverse fascia will then come into view; this being raised in the same manner as the skin, is also divided in the same way; but a small cut should be made, however, sufficiently large for the introduction of the point of a grooved director. With this instrument the fascia is raised at one end of the incision, and if no underlying vessel is seen between the director and the fascia, the blunt side of the bistoury is placed in the groove, and its sharp edge, turned upward, is pushed through the fold of fascia. This is repeated for the lower end of the cut. The deep fascia, which comes next into view, and unites the two pairs of muscles—the sterno-hyoid and sterno-thyroid—is treated in the same way. Care should be taken in dividing the folds of the fasciæ, to make the incision in them as long as that of the skin, to avoid a funnel-shaped wound by the time the trachea is reached. A layer of areolar tissue is then met with, containing some fat and engorged veins. If possible, the latter should be pushed aside gently with the convex surface of the grooved director, or with the handle of the knife, and if this cannot be done, two ligatures are passed around the vessels some distance apart, and the latter are then divided. By this time the sides of the wound tend to come together and interfere with further steps; and if assistants are at hand, hooks must be used to keep the wound open. In a case of emergency, with no one to assist me, Bosworth's nostril dilator (Fig. 8) served the purpose admirably, its blades being bent outward somewhat so as to prevent their slipping out.

At this stage of the operation, the depth of the wound exceeds greatly the expectation of the young operator, and he is apt to believe that the trachea has been "missed," considering its apparent proximity to the skin before the operation was begun. His fears will be quieted, however, when, after carefully separating the layer of cellulo-adipose tissue in the median line with the grooved director, watching for vessels, the denuded trachea will appear. At the upper part of the wound in this location, the isthmus of the thyroid gland will generally be found; it should be pushed upward and out of the line of the cut, if possible; if not, it should be divided between two ligatures.

An important point, is to control any bleeding arteriole or vein that may cause the bottom of the wound to quickly become hidden in blood. This may be done by means of small sponges, and by ligating any vessel of importance, the ligatures being cut short. The wound being comparatively dry, the next step is to open the trachea. To prevent any deflection of the latter it must be held firmly by means of a sharp tenaculum stuck through its wall at the upper commissure of the wound, with the handle towards the face of patient. Raising the trachea slightly from its bed and holding it firmly, the point of a small but strong bistoury is pushed through its wall, beginning at the lower part of the exposed portion, the back of the instrument being turned towards the sternum. Cutting upward carefully, avoiding long sweeps so as not to wound the opposite suface of the trachea, three rings are divided, making, in an adult, an incision about three-quarters of an inch in length. The curved tips of an instrument such as that shown in Fig. 89,

Fig. 89.



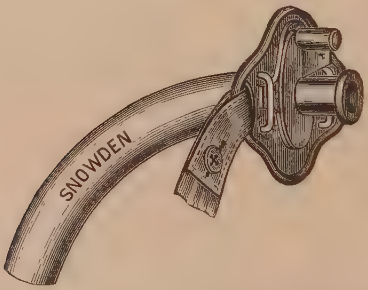
Trousseau's dilator.

are then introduced into the tracheal opening, and the rings being approximated, its edges are separated.

The moment the trachea is opened, a quantity of mucus tinged with blood is generally coughed out, and the lungs seem to empty themselves of all the air in them; the patient then ceases to breathe, and a period is passed during which respiration seems completely suspended, a source of great anxiety to an operator of limited experience. At last, a long, deep breath is taken, and from that on respiration is normal. The canula can either be introduced as soon as the trachea is opened, or after the respiration has been re-established. I prefer the latter procedure, the larger opening serving better for the evacuation of what mucus, blood, etc., may be present in the trachea, than the aperture of the canula. After two or three inspirations have been taken, therefore, the instrument is gently but quickly introduced, the tracheal retractors being disengaged at the same time. An exception to this practice should always be made, however, when there is hemorrhage of the tissues, and when time cannot be taken to arrest it. In this case, two small sponges are pressed tightly on the bleeding tissues, one on each side of the trachea, and, the latter being suddenly opened, the canula is immediately introduced, the sponges being taken off at the same time. The flow of blood ceases almost immediately upon the restoration of the normal breathing; for prudence's sake, however, the patient should be raised and leaned forward, so as to cause what blood might ooze from the wound to flow externally, instead of in the trachea. When the operation has been satisfactorily performed, the external wound above and below the tube is closed by adhesive strips, taking care to approximate and adjust the edges accurately. The lower end of the wound should remain open for drainage.

The choice of a canula is an important matter. Of the large number at our disposal, that of Trousseau, improved by Roger, who made the neck plate movable around the tube so as to give the latter free motion, and further improved by Ober, who first proposed the use of an inner tube, which can be taken out at will for cleansing, thus avoiding the necessity of withdrawing the external tube, is probably the best. As generally sold, the outer tube is furnished with an oval opening or fenestra on the upper side of the curved portion to enable the patient to breathe through the natural passages, or to talk by placing his finger on the external opening of the canula. This is not only an unnecessary addition to the instrument, but a pernicious one. The space around the part of the canula inside the trachea is sufficiently large to enable the patient to breathe and speak; as to the fenestra, it is liable to irritate the mucous membrane of the posterior wall of the trachea, and cause ulceration.

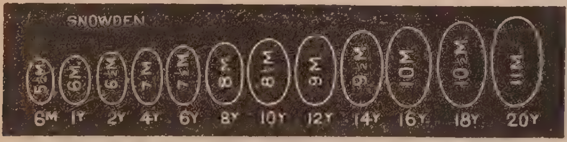
Fig. 90.



Trousseau's tracheotomy tube, improved, showing the method employed to attach the neck-tape.

The instrument should either be of silver or of aluminium, the latter metal presenting the advantage of light weight. The hard-rubber tracheotomy-tubes which are generally sold are undesirable owing to their thickness, and the difficulty of keeping them clean. As to the sizes that should be employed for the different ages, the scale shown in Fig. 91 may be found useful. It represents the size which the orifice of the internal tube should present, to supply the lungs with a sufficient amount of air. It is based upon experiments conducted by means of tubes held between the lips, the nose being closed with the fingers. A smaller diameter than that represented in the cut as being required by a given case, would, after a few moments, cause an uncomfortable "need of more air." According to the scale, the measurements of which are given in millimetres, the canula shown in Fig. 92 would be adaptable for a child about two or three years of age. The oval shape is selected, because it enables the air to pass freely on each side of the tube if the patient wishes to use his voice, and because it exerts less pressure upon the sides of the tracheal wound. The tube is sufficiently small, as compared with the cavity of the trachea, to enable it to have free motion during deglutition.

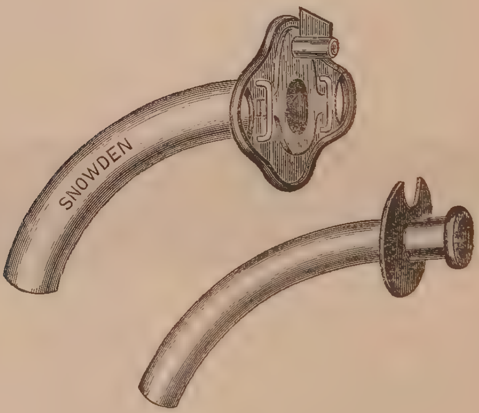
Fig. 91.



Author's scale for tracheotomy tubes.

After-treatment.—The success of the operation depends as much upon the judicious care bestowed upon the patient, and the proper attention to details, as it does upon the skill of the operator. During the operation, and as long as the patient is confined to his room, generally about a week, the atmosphere should be kept at a temperature of not less than 80° Fahr., and maintained in a moist state by means of steam, obtained by boiling water in the apartment. In short, the object should be to furnish the lungs with air possessing as nearly as possible the properties it would possess if it were inhaled through the nose. To further attain this object, the foreign particles floating in the atmosphere can be arrested at the mouth of the canula by straddling a piece of thin muslin over it; care should be taken, however, not to attach it so as to interfere with the free discharge of mucus. The best means is to tie a thin muslin handkerchief around the neck, above the canula, letting it overhang its orifice. This not only prevents the ingress of dust during inspiration, but also serves to prevent the regurgitation of mucus, which often takes place without such a contrivance, when a coughing spell forces the discharges up to the mouth of the tube.

Fig. 92.

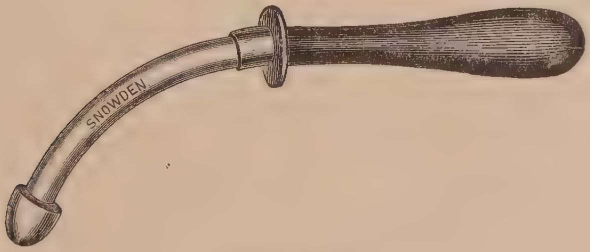


Tracheotomy tube with inner canula drawn out.

An important point is to keep the canula as free as possible from the copious discharges which are formed for a couple of days after the operation. An intelligent attendant should be carefully instructed to withdraw the inner canula every two hours, to cleanse it carefully with hot water, then to re-introduce it into the outer tube after having effectively freed the cavity of the latter of any mucus that might have accumulated there. This may be done by means of a feather, a piece of sponge, or absorbent cotton securely and tightly fastened to a suitably bent piece of thin brass wire.

The patient should be provided with two complete canulas so as to occasionally be able to withdraw the outer tube also and cleanse it thoroughly. This can be done after a couple of days, the wound having had time to assume the shape of the outer canula, thus enabling it to remain patulous for a short time after the instrument has been withdrawn complete. The extra canula, previously warmed to avoid exciting cough, should be introduced immediately upon the withdrawal of the other, using, to assist its entrance, a pilot, such as that shown in Fig. 93, invented by Dr. Cohen. This instrument, introduced into the outer canula, presents a blunt-pointed knob which separates what tissues might impede the progress of the latter. It should, of course, be instantly withdrawn as soon as the tube is in position. The occasional (once or twice a week after the first few days) withdrawal of the tubes serves also to avoid what danger the corrosion of a metallic canula might incur. Cases have been reported in which pieces of such a canula, broken off at an eroded point, occasioned alarming symptoms.

Fig. 93.



Cohen's canula pilot.

Occasionally, granulations are formed at the external tracheal orifice, and in the trachea itself, the latter being especially the case when a fenestrated tube is employed. Strong astringent solutions sometimes suffice to destroy them; in some cases, however, surgical measures are necessary.

When the canula is to be withdrawn permanently, the natural breathing powers of the patient should be tested by closing the aperture of the canula with a stopper. If this is borne without difficulty, the instrument may be withdrawn, but kept within easy reach, with pilot in position, for sudden replacing if necessary. As a rule, however, this is not required, and the wound closes up after a few days to finally heal completely a week or two later.

The canula has occasionally to be worn permanently, the patient, to speak, being obliged to place his finger upon the external opening. In this case, Luer's tracheotomy-tube, the inner canula of which contains a silver pea, whose object is to arrest the expired current of air, so as to enable it to pass between the vocal bands, will be found very useful, rendering the use of the finger to close the tube unnecessary.

APPENDIX.

To the methods of treatment described in the body of the work, the author has thought it advisable to add a list of the formulæ which he has found to possess special merit. To these are added selections from the several therapeutic measures proposed, within the last two years, by different authors. The names of the latter are given in each case; the author's formulæ, however, will bear no name.

ACUTE CORYZA.

℞	Hydrochlorate of cocaine	gr. vj.
	Subcarbonate of bismuth	ʒss.
	Talc.	ʒiss.

M. Use.—Enough to cover a silver five-cent piece insufflated into each nostril every two hours.

℞	Nitrate of pilocarpine	gr. viij.
	Tinct. of aconite root	ʒss.
	Tinct. of belladonna	♏x.
	Tinct. of veratrum viride . . .	♏x.
	Syrup of orange peel, enough to make	℥ij.

M. Use.—For severe cold. One teaspoonful every two hours three times, then every three hours, remaining in-doors.

℞	Purified chloroform	ʒij.
	Glycerine	
	French brandy, of each . . .	℥j.

M. S.—One teaspoonful in water every three hours.

Dr. Gentilhomme.—One-half milligr. sulphate of atropine in violent cases. Effective when prescribed early.—*France Médicale.*

Dr. M. Ffalliott.—A quinine spray, gr. vj in the ounce of water, arrests early symptoms in twelve hours.—*British Med. Journal.*

Dr. J. L. Davis.—Tartar emetic, gr. ss to water, one ounce. One teaspoonful every quarter of an hour four times, then every three hours.—*Medical Brief*

Dr. S. Solis Cohen.—Salicylate of ammonium gr. x–xv, repeated every second hour until *tinnitus aurium* is produced. Indicated in later stages.—*Medical Times.*

Dr. J. E. Dobson (British Army).—ʒss. camphor in shaving jugful of boiling water. A cone of paper is placed over the jug, the end of the cone at opening, the base being used to introduce the face. Breathe freely from ten to twenty minutes, and repeat three or four times in as many hours.—*London Lancet.*

Dr. J. M. Goss, Marietta, Ga.—In fully established case, with cough, bryonia gr. ss–j every hour or two. When expectoration is difficult, gr. $\frac{1}{4}$–$\frac{1}{2}$ bichromate of potash.—*Chicago Med. Times.*

Dr. Sandras.—Inhalations of the fumes of 100 gram. of turpentine poured on 20 gram. of Norwegian tar.—*Bulletin de l'Académie de Médecine.*

SIMPLE CHRONIC AND HYPERTROPHIC RHINITIS.

WASHES.

Dobell's Solution :—

℞	Carbolic acid, liq.	♏xxx.
	Biborate of sodium	
	Bicarbonate of sodium, of each . .	ʒj.
	Glycerine	ʒiiiss.
	Water, enough to make	℥iv.

M.—To be used with atomizer.

Dr. C. E. Bean, St. Paul, Minn. :—

℞	Salicylate of sodium	ʒij.
	Borate of sodium	ʒiij.
	Glycerine	℥ss.
	Water enough to make	℥vj.

M. Use.—Dessertspoonful in one pint water. To be used with spray or as douche.

Dr. David Newman, Glasgow :—

℞	Bicarbonate of sodium	ʒj.
	Carbolic acid	gr. xx.
	Glycerine	℥ss.
	Water enough to make	℥iv.

M. Use.—To be used with atomizer.—*British Med. Journal.*

Prof. D. Hayes Agnew, Philadelphia.—Sage tea used as douche. Detergent, and credited with curative properties.—*Therapeutic Gazette.*

Dr. J. N. Mackenzie, Baltimore.—Solution of bichloride of mercury gr. j to one pint of water, adding ʒij cherry laurel water.—*Maryland Med. Journal.*

Dr. E. Rosenthal, New York.—Eucalyptol, ʒj, in an eight-ounce vial, adding boiling water. Used as an inhalant twice or three times daily.—*Am. Med. Digest.*

Drs. Masini and Massei.—Resorcin, one-half to one per cent. solution used with atomizer, twice daily, four minutes each time.—*France Médicale.*

TABLETS.*

1.	℞	Borate of sodium	℈j.
		Bicarbonate of sodium	℈iss.
		Carbolic acid	gr. iij.

For one tablet; to be dissolved in Oj water, at 100° F.; used with atomizer, three or four minutes three times daily, as detergent.

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* Made by Mr. W. H. Llewellyn, pharmacist, Philadelphia.

2. ℞ Chlorate of potassium . . . . . ℈ij.
Salicylate of sodium . . . . gr. xx.
For one tablet; to be used as above.

Astringent Tablets:—

3. ℞ Ext. of hydrastis canad. . . . ℈ij.
Ext. of Canadian pine . . . . gr. xx.
Borate of sodium . . . . . ʒss.
For one tablet; to be used as above.

4. ℞ Tannic acid . . . . . . gr. ℈ij.
Gallic acid . . . . . . gr. xx.
Bicarbonate of sodium . . . . ʒss.
For one tablet; to be used as above.

5. ℞ Sulpho-carbolate of zinc . . . ʒj.
Biborate of sodium . . . . ʒss.
For one tablet; to be used as above.

FLAT BOUGIES.*

1. ℞ Ext. of belladonna . . . . gr. ij.
Ext. of hydrastis . . . . . gr. v.
For one bougie.

2. ℞ Hydrochlorate of cocaine . . . gr. j.
Extract of ergot . . . . . gr. iij.
For one bougie.

3. ℞ Extract of erythroxylon coca . .
Extract of Canadian pine, of each . gr. v.
For one bougie.

4. ℞ Extract of opium . . . . . gr. j.
Extract of krameria . . . . gr. ij.
For one bougie.

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* Made by Messrs. Foote & Swift, Philadelphia.

5. ℞	Sulphate of zinc	gr. ss.
	Extract of opium	gr. iss.

For one bougie.

6. ℞	Hydrochlorate of cocaine	gr. j.
	Tannic acid	gr. iij.

For one bougie.

7. ℞	Extract of hamamelis	gr. v.
	Hydrastine (alkaloid)	gr. iij.

M. S.—For one bougie.

8. ℞	Resorcine	gr. ss.
	Extract of hamamelis	gr. v.
	Hydrochl. of cocaine	gr. ss.

M. S.—For one bougie.

OINTMENTS.

1. ℞	Acetate of morphia	gr. iv.
	Tannic acid	
	Iodoform, of each	ʒss.
	Vaseline	℥ss.

M. S.—To be applied to nostrils with cotton pledget.

2. ℞	Gallic acid	ʒss.
	Belladonna ointment	
	Cosmoline, of each	ʒij.

M. S.—Apply with cotton pledget.

3 ℞	Yellow sulphate of mercury	gr. iij.
	Cosmoline	℥ss.

M. S.—Apply with cotton pledget.

Dr. A. V. Banes, St. Joseph, Mo.:—

℞	Oil of eucalyptus	ʒij.
	Bee's wax	ʒj.
	Boracic acid	ʒiij.
	Vaseline, enough to make	℥j.

M.—Dissolve the wax in the vaseline and add other ingredients.

S.—Apply to the nostrils and assume recumbent position to cause ointment to run back to posterior cavity.

POWDERS.

Dr. Lefferts, of New York:—

℞	Salicylic acid	gr. x.
	Tannic acid	ʒj.
	Subcarb. of bismuth	ʒj.

—*Nasal Catarrh*, St. Louis, 1884.

Dr. M. Mackenzie, London:—

℞	Tannic acid, powdered	gr. v.
	Iodoform, "	gr. ij.
	Gum acacia, "	gr. iij.

—*Throat Hosp. Pharm.*

Dr. Whistler, of London:—

℞	Carbonate of Bismuth	gr. vii.
	Acetate of Morphia	gr. $\frac{1}{4}$.
	Iodoform	gr. v.
	Gum acacia	gr. v.

—*Throat Hosp. Pharm.*

Dr. Beverly Robinson, New York:—

℞	Sulphate of morphia	gr. j.
	Belladonna leaves, pulverized	gr. x.
	Calomel	gr. xx.
	Bicarbonate of soda	gr. xv.
	Acacia, pulverized	℥ss.

M. —*Nasal Catarrh, etc.*, New York, 1885.

ATROPHIC RHINITIS.

Mr. Edw. Woakes, London Throat Hospital:—

℞	Boracic acid	gr. lx.
	Glycerine	♏xx.
	Water	ʒvj.
	Cotton wool, a thin sheet	ʒj.

Mix the boracic acid, glycerine and water, and dissolve with the aid of heat. Saturate the wool evenly with the solution and dry by exposure to the air with a moderate heat.

Use.—(See Gottstein's cotton wool tampons, p. 120.)

Dr. Frank P. Foster, New York:—

℞	Iodoform	ʒss.
	Oil of Eucalyptus	♏iv
	Vaseline	ʒss.

M. Use.—(See Gottstein's cotton wool tampons, p. 120.) Excellent ointment in atrophic and syphilitic rhinitis.

HAY FEVER.

Dr. W. Judkins, Cincinnati.—Hydriodic acid syrup, one teaspoonful every two hours. Pure acid, three to five drops on sugar.—*N. Y. Med. Record.*

Dr. W. F. Phillips.—Succus belladonnæ, one minim every hour.—*Med. Bulletin.*

Dr. O'Connell.—Small pieces of cotton wool saturated with glycerine introduced in each nostril.—*Med. Bulletin.*

ACUTE PHARYNGITIS.

1.*	℞	Hydrochlorate of cocaine	gr. $\frac{1}{2}$.
		Chlorate of potash	gr. ij.
		Acacia and sugar	
		Black currant paste	s. q.

M.—For one lozenge.

Use.—One every two hours.

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* The numbered lozenges are made by Mr. W. H. Llewellyn, Philadelphia.

2. ℞	Borate of sodium	
	Chlorate of potash, of each	gr. ij.
	Acacia, sugar and black currant paste	s. q.

M.—For one lozenge.

Use.—One every two hours when the throat is dry.

3. ℞	Resin of guaiac	gr. iss.
	Borate of sodium	gr. iss.
	Chloride of ammonium	gr. j.
	Acacia, sugar and black currant paste	s. q.

M.—For one lozenge.

Use.—One every two hours in early stages.

Dr. C. L. Mitchell, Philadelphia:—*

℞	Ext. Hyoscyamus	gr. $\frac{1}{10}$.
	Aqueous ext. of opium	gr. $\frac{1}{20}$.
	Fld. ext. ipecac	gr. $\frac{1}{5}$.
	Fld. ext. wild cherry	gr. j.
	Gelatin	s. q.

Use.—One every two hours.

CHRONIC PHARYNGITIS.

4. ℞	Carbolic acid	gr. $\frac{1}{4}$.
	Cubebs	gr. j.
	Rhatany	gr. ij.
	Chlorate of potash	gr. ij.
	Acacia, sugar and black currant paste	s. q.

M.—For one lozenge.

Use.—Valuable for singers, in whom a relaxed throat causes frequent hoarseness.

5. ℞	Hydrochlorate of cocaine	gr. $\frac{1}{6}$.
	Benzoic acid	gr. ss.
	Cubebs	gr. j.
	Chlorate of potash	gr. ij.
	Licorice, acacia and sugar	s. q.

M. Use.—One every hour.

Useful in subacute exacerbations of chronic pharyngitis.

---

* Dr. Mitchell's lozenges are made by Messrs. C. L. Mitchell & Co., Philadelphia.

Dr. C. L. Mitchell, Philadelphia:—

℞	Hydrastis canad.	gr. ij.
	Gelatine	s. q.

Use.—One every three hours, in later stages.

6.	℞	Extract of lettuce	gr. iss.
		Codeia	gr. ss.
		Extract of hyoscyamus	gr. ss.
		Gelatine, acacia and sugar	s. q.

M. Use.—One every two hours.

Rapidly effective in subacute exacerbations of chronic pharyngitis. Should not be used by singers within an hour before singing.

7.	℞	Chloride of ammonium	gr. ij.
		Chloride of potash	gr. j.
		Acacia, sugar and licorice	s. q.

M. Use.—Valuable in atrophic or dry pharyngitis.

TONSILLITIS.

8.	℞	Hydrochlorate of cocaine	gr. $\frac{1}{6}$.
		Resin of guaiac	gr. ij.
		Carbolic acid	gr. $\frac{1}{4}$.
		Acacia, sugar and red currant paste	s. q.

M. Use.—This lozenge will arrest tonsillitis in a few hours, if administered early, one every hour.

Dr. Giné, of Bruxelles.—Bicarbonate of soda to inflamed tonsils, insufflated, or applied with finger.—*Presse Médicale Belge.*

Dr. Hormedzdji.—Salicylate of sodium, gr. xv, every hour until urgent symptoms relieved, then reduce to half. Use as gargle.

℞	Salicylate of sodium	gr. x.
	Glycerine	ʒj.
	Water	℥iij.

M. —*Lancet and Clinic.*

Dr. H. G. Houston.—Fluid extract of eucalyptus, one teaspoonful in one ounce of water as hot as can be borne; gargle and spray every twenty minutes.—*Atlantic Journal of Med.*

HYPERTROPHIED TONSILS.

Dr. Moresco, of Cadiz, Spain.—Acetic acid, interstitial injections.—*Revista de Med. y Chir. Practica.*

Dr. Chisholm.—Chloride of zinc. Saturated solution, introduced into crypts with cotton pledget.—*Southern Med. Record.*

Dr. J. G. Partagas.—Bicarbonate of sodium, applied three times daily with finger, over surface of tonsils, brings on gradual resolution.—*London Lancet.*

RELAXED PALATE AND UVULA.

9.	℞	Alum	gr. ij.
		Borate of sodium	gr. j.
		Rose leaves	gr. ij.
		Acacia, sugar and black currant paste	s. q.

M.—For one lozenge.

Use.—One every three hours.

10.	℞	Extract of rhatany	gr. ij.
		Tannic acid.	gr j.
		Acacia, sugar and red currant paste	s. q.

M. Use.—One every three hours.

SUBACUTE LARYNGITIS.

In ordinary hoarseness Nos. 1 and 6 lozenges will be found very effective; for singers, however, No. 4, or the following will be more satisfactory:—

11.	℞	Benzoic acid	gr. ½.
		Borate of sodium	gr. iss.
		Acacia, sugar and red currant paste	s. q.

M Use.—One every hour.

Frequently succeeds in checking early symptoms.

12.	℞	Erythroxylon coca	gr. ij.
		Hydrochlorate of cocaine	gr. ½.
		Licorice, sugar and acacia	s. q.

M. Use.—One every two hours.

Valuable in severe cases complicated with dysphagia.

13.	℞	Cubebs	gr. ss.
		Dover's powder	gr. ij
		Licorice, sugar and acacia	s. q.

M. Use.—One every three hours.

A very effective lozenge during the entire course of the affection.

Dr. Corson.—Diaphoretics in aphonia. Nitrate of potassium, ʒij, or infusion of jaborandi made by placing ℈ij of the leaves in a small cup of boiling water.—*Braithwaite's Retrospect.*

Dr. L. Jurist, Philadelphia:—

℞	Fld. ext. coca leaves	gr. v.
	Tinct. aconite root	gr. ½.
	Tinct. belladonna	gr. j.
	Gelatine	s. q.

M. Use.—One every two hours.

Dr. C. L. Mitchell, Philadelphia:—

℞	Benzoic acid	gr. ¼.
	Camphor	gr. ½.
	Resin guaiac	gr. ½.
	Gelatine	s. q.

M. Use.—One every three hours.

CHRONIC LARYNGITIS.

For this affection the choice of the agents to be administered should be guided by the degree of secretion present. When this is slight, an anodyne lozenge, such as No. 6 or No. 7, alternating with an astringent one, such as No. 9, will be found efficacious. When the secretion is profuse, local stimulation and astringency are required.

14.	℞	Benzoic acid	gr. ½.
		Alum	gr. ij.
		Chlorate of potassium	gr. j.
		Licorice, acacia and sugar	s. q.

M. Use.—One every three hours.

15.	℞	Oleo-resin of cubebs	♏ss.
		Resin of guaiac	gr. j.
		Oil of sassafras	♏¼.
		Tolu, acacia and sugar	s. q.

M. Use.—One every three hours.

16.	℞	Oil of eucalyptus	♏⅛.
		Oil of tar	♏½.
		Ext. of Canadian pine	gr. j.
		Acacia, sugar and black currant paste	s. q.

M. Use.—One every four hours.

Dr. C. L. Mitchell, Philadelphia:—

℞	Bromide of potassium	gr. iij.
	Gelatine	s. q.

Use.—One every hour when there is pain.

TUBERCULOUS LARYNGITIS.

Dr. Felix Semon, of London:—

℞	Iodoform	
	Boracic acid, of each	gr. j.
	Acetate of morphia	gr. ⅙.

M. Use.—For one insufflation. —*Lancet.*

Dr. Fletcher Ingals, of Chicago:—

℞	Sulphate of morphia	gr. iv.
	Carbolic acid	
	Tannic acid, of each	℈iss.
	Glycerine	
	Water, of each	ʒiv.

M. Use.—To be applied to larynx with brush. —*Med. World.*

17.	℞	Hydrochlorate of cocaine	gr. $\frac{1}{4}$.
		Borax	gr. ij.
		Gum acacia	gr. ij.
		Marshmallow root	gr. ij.

M.—Macerate marshmallow in orange-flower water twelve hours; strain, then add cocaine, borax and acacia; evaporate to consistency of honey, with constant stirring, and add gradually white of egg beaten up with more orange-flower water. Evaporate, stirring till paste will not adhere to hands.

(Process employed for the London Throat Hospital marshmallow lozenge.)

Use.—To be dissolved slowly in the mouth ten minutes before meals, or when required by the pain.

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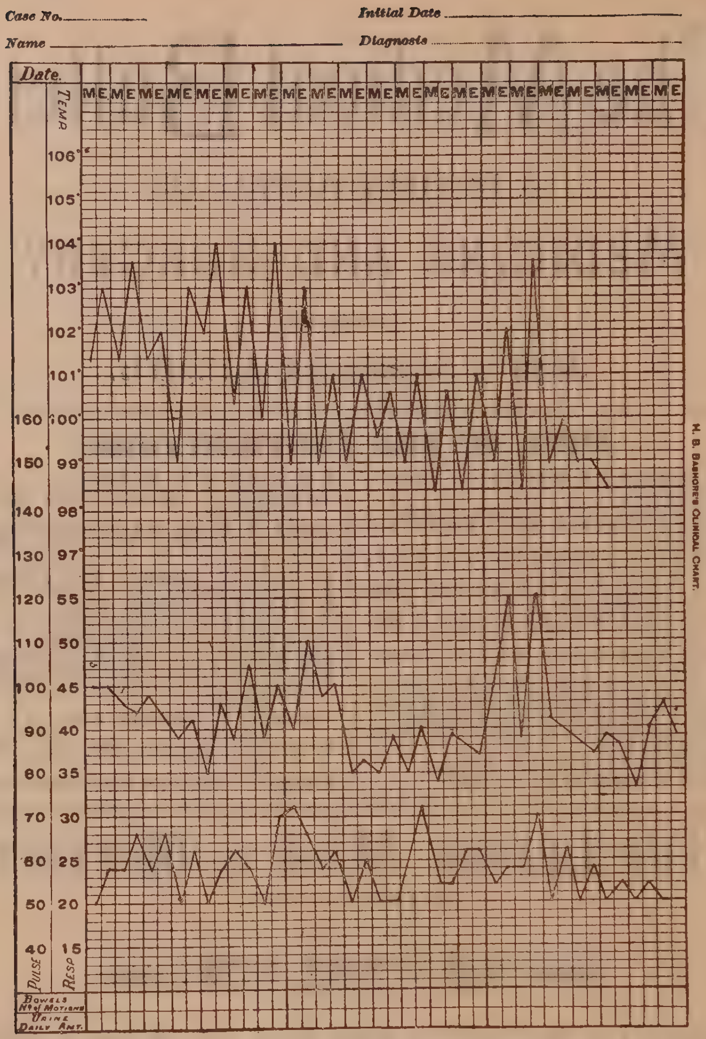

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—BY—

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Obstetrician to the Philadelphia Hospital, and Lecturer on Diseases of Women and Children; Surgeon to the Maternity Hospital; Physician to St. Joseph's Hospital; Fellow of the College of Physicians of Philadelphia, etc.,

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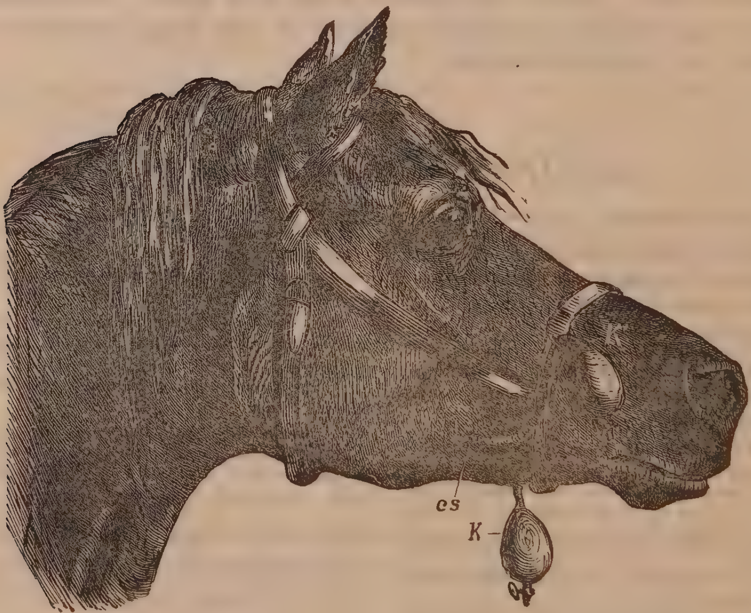

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TINCTURAL.

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* 60 Fineness of Powder as per U. S. P.
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